



**Calhoun: The NPS Institutional Archive**  
**DSpace Repository**

---

Theses and Dissertations

1. Thesis and Dissertation Collection, all items

---

2001-03

Impact of including realistic combat  
identification requirements on a large scale  
information system architecture versus the  
use of a separate combat identification  
information system network.

Stewart, Kevin J.

Monterey, California. Naval Postgraduate School

---

<http://hdl.handle.net/10945/32962>

---

*Downloaded from NPS Archive: Calhoun*



Calhoun is the Naval Postgraduate School's public access digital repository for research materials and institutional publications created by the NPS community. Calhoun is named for Professor of Mathematics Guy K. Calhoun, NPS's first appointed -- and published -- scholarly author.

**Dudley Knox Library / Naval Postgraduate School**  
**411 Dyer Road / 1 University Circle**  
**Monterey, California USA 93943**

<http://www.nps.edu/library>

# NAVAL POSTGRADUATE SCHOOL

## Monterey, California



## THESIS

**IMPACT OF INCLUDING REALISTIC COMBAT  
IDENTIFICATION REQUIREMENTS ON A LARGE  
SCALE INFORMATION SYSTEM ARCHITECTURE  
VERSUS THE USE OF A SEPARATE COMBAT  
IDENTIFICATION INFORMATION SYSTEM NETWORK**

by

Kevin J. Stewart

September 2000

Thesis Advisor:

John Osmundson

Approved for public release; distribution is unlimited.

DTIC QUALITY INSPECTED 4

20001026 142

<b>REPORT DOCUMENTATION PAGE</b>			FORM APPROVED OMB NO. 0704-0188	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington DC 20503.				
1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE September 2000		3. REPORT TYPE AND DATES COVERED Master's Thesis
4. TITLE AND SUBTITLE: Impact of Including Realistic Combat Identification Requirements on a Large Scale Information System Architecture Versus the use of a Separate Combat Identification System Network				5. FUNDING NUMBERS
6. AUTHOR(S) Kevin J. Stewart				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Postgraduate School Monterey, CA 93943-5000				8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) N/A				10. SPONSORING/ MONITORING AGENCY REPORT NUMBER
11. SUPPLEMENTARY NOTES The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.				
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution is unlimited.				12b. DISTRIBUTION CODE
13. ABSTRACT (maximum 200 words) This thesis reports the findings of a simulation to determine the most effective solution between adedicated Combat Identification (CID) situational awareness network versus including CID information on a full functioning network. The architecture used to make this determination was based on the Navy and Marine Corps Extended Littoral Battlespace (ELB) Advanced Concept Technology Demonstration (ACTD). This demonstration implemented a wide-area wireless battlenet using WaveLan and VRC 99A technologies. The simulation was accomplished with the use of a leading edge simulation tool, EXTEND™, and the specifications inherent to wireless communications. EXTEND was used to replicate the protocols that are inherent within the WaveLAN and VRC-99A systems. A feasible sized architecture was modeled utilizing scaling techniques, which simulated the operation of a Marine ExpeditionaryBrigade (MEB), covering a 200X200 mile wireless tactical battlespace. A full functioning network was developed and then modified to include CID information requirements. A comparison of the data latency between the models was the determining factor. This thesis demonstrates that a full functioning network is capable of handling CID information requirements.				
14. SUBJECT TERMS Combat Identification, networks, tactical networks, communications, systems.				15. NUMBER OF PAGES 236
				16. PRICE CODE
17. SECURITY CLASSIFICATION OF REPORT Unclassified		18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified		19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified
				20. LIMITATION OF ABSTRACT UL

NSN 7540-01-280-5500

Standard Form 298 (Rev. 2-89)

Prescribed by ANSI Std.

239-18

THIS PAGE INTENTIONALLY LEFT BLANK



Approved for public release; distribution is unlimited

**IMPACT OF INCLUDING REALISTIC COMBAT IDENTIFICATION  
REQUIREMENTS ON A LARGE SCALE INFORMATION SYSTEM  
ARCHITECTURE VERSUS THE USE OF A SEPARATE COMBAT  
IDENTIFICATION INFORMATION SYSTEM NETWORK**

Kevin J. Stewart  
Captain, United States Marine Corps  
B.A., North Carolina State University, 1991

Submitted in partial fulfillment of the  
requirements for the degree of

**MASTER OF SCIENCE IN INFORMATION TECHNOLOGY MANAGEMENT**

from the

**NAVAL POSTGRADUATE SCHOOL  
September 2000**

Author:

Kevin J. Stewart

Approved by:

John Osmundson, Thesis Advisor

Rex Buddenberg, Thesis Co-Advisor

Dan C. Boger, Chairman  
Department of Systems Technology

THIS PAGE INTENTIONALLY LEFT BLANK

## **ABSTRACT**

This thesis reports the findings of a simulation to determine the most effective solution between a dedicated Combat Identification (CID) situational awareness network versus including CID information on a full functioning network. The architecture used to make this determination was based on the Navy and Marine Corps Extended Littoral Battlespace (ELB) Advanced Concept Technology Demonstration (ACTD). This demonstration implemented a wide-area wireless battlenet using WaveLan and VRC 99A technologies. The simulation was accomplished with the use of a leading edge simulation tool, EXTEND<sup>TM</sup>, and the specifications inherent to wireless communications. EXTEND was used to replicate the protocols that are inherent within the WaveLAN and VRC-99A systems. A feasible sized architecture was modeled utilizing scaling techniques, which simulated the operation of a Marine Expeditionary Brigade (MEB), covering a 200X200 mile wireless tactical battlespace. A full functioning network was developed and then modified to include CID information requirements. A comparison of the data latency between the models was the determining factor. This thesis demonstrates that a full functioning network is capable of handling CID information requirements.

THIS PAGE INTENTIONALLY LEFT BLANK

## TABLE OF CONTENTS

I. INTRODUCTION.....	1
A. BACKGROUND.....	1
B. OBJECTIVE.....	3
C. SCOPE AND METHODOLOGY.....	4
D. ORGANIZATION OF THE STUDY.....	5
II. ARCHITECTURE.....	7
A. LITTORAL DOCTRINE.....	7
1. Operational Maneuver from the Sea.....	8
2. Ship-to-Objective Maneuver.....	9
B. THE EXTENDED LITTORAL BATTLESPACE.....	11
1. Background.....	11
2. Objectives.....	12
3. Concept of Operations for Network Support.....	12
4. Network Objective.....	13
C. EXTENDED LITTORAL BATTLESPACE SYSTEMS.....	15
1. WaveLAN/IEEE.....	15
2. WaveLAN Access Point.....	17
3. AN/VRC-99A.....	18
III. NETWORK MODEL DEVELOPMENT.....	21
A. MODELING AND SIMULATION.....	21
1. Background and Terminology.....	21
2. Extend Software.....	22
3. Design Steps.....	23
B. THE EXTEND MODELS.....	23
1. Description of a Three EUT Access Point.....	25
a. End User Terminal.....	26
b. Access Point.....	27
2. Description of an AN/VRC-99A.....	30
3. Initial Network Configuration.....	32
4. Initial Network Test Results.....	33
IV. COMPLETE NETWORK MODEL.....	37
A. BACKGROUND.....	37
B. SIZE OF FORCE.....	37
1. MEB Force Structure.....	39
C. INFORMATION REQUIREMENTS FOR A FULL-SCALE NETWORK.....	41
D. INFORMATION REQUIREMENTS FOR A SEPARATE CID NETWORK.....	44
V. NETWORK CHARACTERISTICS AND SIMULATION RESULTS.....	49
A. OPERATING CHARACTERISTICS.....	49
B. SCALING THE MODEL.....	50
C. SIMULATION RESULTS.....	51
1. Full-Scale Network.....	52
2. Full-Scale Network and CID.....	54
3. Stand-Alone CID.....	61
VI. CONCLUSIONS AND RECOMMENDATIONS.....	65
A. CONCLUSIONS.....	65
B. RECOMMENDATIONS.....	68
C. FUTURE AREAS OF RESEARCH.....	69
APPENDIX A. DATA DICTIONARY.....	73

APPENDIX B. END USER TERMINAL LOGIC .....	75
APPENDIX C. INTERNAL/EXTERNAL LOGIC .....	77
APPENDIX D. SENSOR LOGIC .....	79
APPENDIX E. DETECTOR LOGIC .....	81
APPENDIX F. ELB ROUTING TABLE .....	83
APPENDIX G. FINAL ROUTING TABLE .....	87
APPENDIX H. DISTRIBUTIONS FOR MESSAGE DESTINATIONS .....	107
APPENDIX I. RUN ONE TEST DATA .....	113
APPENDIX J. RUN TWO TEST DATA .....	147
APPENDIX K. RUN THREE TEST DATA .....	185
APPENDIX L. EXTEND DEFINITION LIST .....	195
APPENDIX M. ACRONYMS .....	207
LIST OF REFERENCES .....	209
BIBLIOGRAPHY .....	211
INITIAL DISTRIBUTION LIST .....	213

## LIST OF FIGURES

1. Ship-to-Objective Maneuver.....	10
2. ELB Communication Network .....	13
3. WaveLAN Card .....	16
4. WavePOINT .....	18
5. AN/VRC-99A .....	19
6. Three EUT Access Point.....	25
7. RTS/CTS Protocol .....	26
8. Initial Break Down of End User Terminal.....	26
9. Internal/External Component of Access Point.....	27
10. Flow of Internal Messages within Access Point .....	28
11. MSG Routing.....	29
12. High Level View of AN/VRC-99A .....	30
13. Detailed View of AN/VRC-99A.....	31
14. Initial ELB Architecture .....	32
15. Delay within AP 1 .....	34
16. Delay within AP 3.....	35
17. Delay within AP 5.....	35
18. MEB Architecture.....	41
19. Run 1, AP 31 Test Results .....	52
20. Run 1 Test Data .....	53
21. Run 1/No VTC Test Data .....	54
22. Run 2 Test Data .....	55
23. Run 2/No VTC Test Data .....	56
24. Run 2/VTC/CID Delays.....	57
25. Run 2/No VTC/CID Delays.....	58
26. Run 2/11 MB Test Data .....	59
27. Run 2/11 MB/CID Delay .....	60
28. Run 3 Test Data .....	61

THIS PAGE INTENTIONALLY LEFT BLANK



## LIST OF TABLES

1. Detrimental Effects of Fratricide .....	2
2. Principles of Operational Maneuver from the Sea.....	9
3. ELB Critical Operational Issues .....	11
4. Desired Qualities of the Extended Wireless Network .....	14
5. Components of the WARNET .....	15
6. Units of a Marine Expeditionary Brigade .....	38
7. OMFTS Information Exchange Matrix .....	42
8. Voice and Video Information Requirements .....	43
9. Message Types and Percentages of Transmission .....	43
10. Message Sizes .....	44
11. Report Interval Determination .....	45
12. Report Interval of CID Messages.....	46
13. Message Priority .....	49
14. Run 1 Test Data .....	53
15. Run 1/No VTC Test Data .....	54
16. Run 2 Test Data .....	55
17. Run 2/No VTC Test Data .....	56
18. Run 2/VTC/CID Delays.....	57
19. Run 2/No VTC/CID Delays.....	58
20. Run 2/11 MB Test Data .....	59
21. Run 2/11 MB/CID Delay .....	60
22. Run 3 Test Data .....	62
23. Summary of Simulation Results .....	63
24. CID Report Interval .....	66
25. Acceptable Delay Rate.....	67

THIS PAGE INTENTIONALLY LEFT BLANK

## **ACKNOWLEDGMENT**

The author would like to acknowledge the technical support, advice, and expertise provided by Professor John Osmundson and Professor Rex Buddenburg. A special thanks to the author's family for their patience and understanding.

THIS PAGE INTENTIONALLY LEFT BLANK

## EXECUTIVE SUMMARY

From a historical perspective, fratricide is as timeless as warfare itself. Self-inflicted losses have always accounted for a significant portion of battle-related casualties. Beyond just the numbers of killed and wounded, fratricide has a compounding impact on the combat effectiveness of a unit. The fear of fratricide can quickly render a unit ineffective.

As the potential for fratricide increases on the modern battlefield, actions must be taken to reduce it. Combat identification (CID) is the process of obtaining an accurate characterization of all potential targets in a combatant's area of the battlefield, so that high confidence and real time application of tactical options and weapon resources can occur. A network that incorporates CID information requirements is essential to reducing fratricide on a modern technologically advanced battlefield. CID information will increase situational awareness, provide a more accurate common tactical picture, improve the target identification process, and increase the effectiveness of command and control procedures.

For any proposed battlefield information system architecture to be successful, CID requirements must be included. CID information requirements are time critical and, therefore, it is essential that the network flow of this information be properly addressed. The extensive amount of CID information will also play a dramatic role in the realization of the vision of Network Centric Warfare.

The primary research objective of this thesis was to determine the most effective solution between a dedicated CID situational awareness network versus including CID information on a full functioning network. A model depicting a full-functioning network was developed using Imagine That, Inc.'s Extend™ simulation software. It was then modified to include CID information requirements and the data latency between the two models was compared. The architecture used as the foundation of modeling efforts was based on the Navy and Marine Corps Extended Littoral Battlespace (ELB) Advanced Concept Technology Demonstration (ACTD).

This demonstration implemented a wide-area wireless battlenet using WaveLAN (wireless local area network) and VRC 99A technologies. The object of the demonstration was to provide for mobile over-the-horizon command and control down to the smallest unit without relying on tactical-satellite communications. The purpose was to prove in principle that a wireless tactical communications network is deployable without the use of permanent ground relay stations or satellites.

The ultimate goal of any battlefield information system should be to provide the commander with one network. Although this is an admirable objective, it should not be done without regard for performance. The time critical nature of CID information and the essential requirement to provide adequate situational awareness, necessitate a reduced latency. If this latency cannot be met with one network, then a separate CID situational awareness network must be developed. This solution has many deficiencies and pitfalls,

but the ultimate goal is to ensure the information is properly propagated through a network to preclude any incidents of fratricide.

Based on the results of the simulations conducted, a single full functioning WaveLAN is also capable of supporting CID information requirements. This ability will only be enhanced as second generation WaveLAN technology is introduced. The ultimate goal is to provide the commander with one network and as much bandwidth as possible to meet all his requirements.

THIS PAGE INTENTIONALLY LEFT BLANK



## **I. INTRODUCTION**

### **A. BACKGROUND**

From a historical perspective, fratricide is as timeless as warfare itself. Self-inflicted losses have always accounted for a significant portion of battle-related casualties. Consider a Company Commander's description of Operation COBRA, a plan to puncture the German defense around the Allied armies in Normandy during World War II:

The dive-bombers came in beautifully and dropped their bombs right where they belonged. Then the first group of heavies dropped them in the draw several hundred yards in front of us...The next wave came in closer, the next still closer. The dust cloud was drifting back toward us. Then they came right on top of us. We put on all the orange smoke we had but I don't think it did any good; they could not have seen it through the dust... [Ref. 1]

The casualties from the bombings were 490 wounded and 111 dead. [Ref. 1] Beyond just the numbers of killed and wounded, fratricide has a compounding impact on the combat effectiveness of a unit. The fear of fratricide can quickly render a unit ineffective. The Office of Technology Assessment (OTA) in 1993 reported on the consequences of fratricide for military readiness. Table 1 outlines the major detrimental effects identified by the OTA study.

- Hesitation to conduct limited visibility operations
- Loss of confidence in unit's leadership
- Increase in leader self-doubt
- Hesitation to use supporting combat systems
- Oversupervision of units
- Loss of initiative
- Loss of aggressiveness during fire and maneuver
- Disrupted operations
- Needless loss of combat power
- General degradation of cohesion and morale

**Table 1. Detrimental Effects of Fratricide (From Ref. 1)**

The military forces of today are entering an era of dynamic change and rapid technological advancement. While past battlefields could be described by linear formations and uninterrupted linear fronts, the battlefield of the future cannot be described in linear terms. The range and lethality of modern weapons has increased the dispersion between units and in spite of new and advanced communications technology, this dispersion strains the limits of positive control and serves to blur the distinction between friendly and enemy controlled areas.

As the potential for fratricide increases on the modern battlefield, actions must be taken to reduce it. Combat identification (CID) is the process of obtaining an accurate characterization of all potential targets in a combatant's area of the battlefield, so that high confidence and real time application of tactical options and weapon resources can occur. [Ref. 2] Key elements of combat identification are target identification and situational awareness. Target identification is the ability to interrogate or fingerprint a potential target to aid the operator's shoot-no-shoot decision. Situational awareness is the

real time, accurate knowledge of one's own location, the location of other friendly forces, and the location of neutrals. The loss of situational awareness and the lack of positive target identification account for most incidents of fratricide. [Ref. 3]

## **B. OBJECTIVE**

A network that incorporates CID information requirements is essential to reducing fratricide on a modern technologically advanced battlefield. CID information will increase situational awareness, provide a more accurate common tactical picture, improve the target identification process, and increase the effectiveness of command and control procedures. For any proposed battlefield information system architecture to be successful, CID requirements must be included. CID information requirements are time critical and, therefore, it is essential that the network flow of this information be properly addressed. The extensive amount of CID information will also play a dramatic role in the realization of the vision of Network Centric Warfare.

This is a conceptual shift that is a result of the tremendous advances in network technology. Although the traditional reliance on sensor based identification and electronic challenge/respond measures are still extremely important, there is an increasing dependence on the tactical picture. A network that can ensure the accurate and timely delivery of this data will dramatically improve situational awareness and provide a more precise common tactical picture.

Even though CID requirements are a significant driving force in determining battlefield information system requirements, they are not adequately being included in the

exploration of critical new operational concepts in support of the Marine Corps' new amphibious doctrine. These new concepts include "Operational Maneuver from the Sea" and "Ship to Objective Maneuver". This vision places unprecedented emphasis on the littoral regions of the world and requires more intimate cooperation between forces afloat and forces ashore.

The time critical nature of CID information and the essential requirement to provide adequate situational awareness, necessitate a reduced latency. If this latency cannot be met with one network, then a separate CID situational awareness network must be developed. The ultimate goal is to ensure CID information is properly propagated through a network to preclude any incidents of fratricide. This study will determine the most effective solution between a dedicated CID situational awareness network versus including CID information on a full functioning network. Data latency will be the determining factor.

### **C. SCOPE AND METHODOLOGY**

The architecture used to make this determination will be based on the Navy and Marine Corps Extended Littoral Battlespace (ELB) Advanced Concept Technology Demonstration (ACTD). This demonstration implemented a wide-area wireless battlnet using WaveLan and VRC 99A technologies. The object of the demonstration was to provide for mobile over-the-horizon command and control down to the smallest unit without relying on tactical-satellite communications. The purpose was to prove in

principle that a wireless tactical communications network is deployable without the use of permanent ground relay stations or satellites.

The scope of this thesis will be limited to the architecture being explored in the ELB demonstration. This architecture will be the foundation for the modeling efforts of a separate CID network and a full functioning network. Models will be developed using Imagine That, Inc.'s Extend™ simulation software. The full functioning network will be modified to include CID information requirements and the data latency between the two models will be compared. A conclusion will then be made between a dedicated CID situational awareness network versus including CID information on a full functioning network.

The anticipated benefit of this research will be the evaluation of a viable network architecture and the impact of emerging technologies on CID. Although CID information requirements are a significant driving force in determining battlefield information system requirements, they have not been included in the ELB experiments. It is anticipated that this research will identify the impact of CID requirements and the potential deficiencies in the ELB architecture.

#### **D. ORGANIZATION OF THE STUDY**

This study will make a recommendation between a dedicated CID situational awareness network versus including CID information on a full functioning network. The architecture used to make this determination will be based on the ELB Advanced Concept Technology Demonstration (ACTD). Chapter II will briefly describe the U. S. Navy and

Marine Corps' Littoral Doctrine and the ELB architecture that is currently being pursued. The technological features of the equipment utilized in the ELB demonstration will also be addressed. This will include descriptions of Lucent's WaveLan technology and Marconi's AN/VRC-99A radio.

The proposed network architectures will be modeled with Imagine That, Inc.'s Extend™ simulation software. Chapter III will begin with a basic description of modeling principles and the Extend software. Chapter III will also provide detailed explanations and descriptions of the network model. Chapter IV will explain the information requirements and the message traffic that will flow across the network. The results of the simulations will be addressed in Chapter V, while the research findings and the necessary recommendations will be included in Chapter VI.

## II. ARCHITECTURE

### A. LITTORAL DOCTRINE

In the future, the United States is likely to face a variety of threats to its security, national interests, and way of life. The preponderance of these threats will surface from the littoral regions of the world. The littorals are those areas characterized by great cities, well-populated coasts, and the intersection of trade routes where land and sea meet. Although the littorals represent a small portion of the world's surface, they consist of three-quarters of the world's population, over eighty percent of the world's capital cities, and the majority of the marketplaces for international trade. These distinguishing characteristics serve to predict that the littorals will be the place where most of the world's important conflicts are likely to occur. [Ref. 4]

The phrase "chaos in the littorals", consists of a world shaped by the clash of the diverse forces of national aspiration, religious intolerance, and ethnic hatred. [Ref. 4] In response to this changing environment, the United States requires a credible, sustainable, forwardly deployable, power projection capability that is independent of forward staging bases, friendly borders, and overflight rights. Support must come from the sea. This close association with the littorals is one of the few common ingredients of future conflicts. In most other respects, future warfare will be characterized by its great variety and unpredictability. The chaos of the future requires that we maintain the capacity to project power ashore against all forces of resistance, ranging from overcoming devastated

infrastructure to assisting a friendly people in need of disaster relief to countering the entire spectrum of armed threats. [Ref. 4]

## 1. **Operational Maneuver from the Sea**

In the White Papers...*From the Sea* and *Forward...From the Sea*, the Navy and Marine Corps presented a common vision for a future in which skillfully handled naval forces would enable the United States to exert its influence in the littoral regions of the world. Building upon the foundation laid by those papers, *Operational Maneuver from the Sea* deals explicitly with the full spectrum of challenges that we will have to face, the dangers and opportunities created by new technologies, and the very prospect of adapting the tradition of maneuver warfare, not merely to amphibious operations, but to all aspects of warfare in, and around, coastal waters. [Ref. 4]

Operational Maneuver from the Sea is a new approach to naval operations. This approach places unprecedented emphasis on littoral areas and requires more intimate cooperation between forces afloat and forces ashore. It is a response to both danger and opportunity. The danger is summarized by the chaos and turmoil that is likely to exist and the opportunity is characterized by the enhancements in information management, battlefield mobility, and the lethality of conventional weapons.

There is no single answer to the many challenges that will present themselves in the future; naval forces will have to adapt as they have done throughout history to changing circumstances. Operational Maneuver from the Sea is the centerpiece of the United States Navy and Marine Corps' preparations. The heart of Operational Maneuver from the Sea is the maneuver of naval forces at the operational level in a bold bid for victory. The goal is to exploit a significant enemy weakness in order to



deal a decisive blow. The center of gravity may be a physical object (a military force, a city, or a region), however, in most instances the center of gravity will be the political and moral forces that sustain an enemies desire to continue the fight.

The distinguishing element of Operational Maneuver from the Sea is the extensive use of the sea as a means of gaining an advantage. The sea can serve as an avenue for friendly movement, while simultaneously creating a barrier to the enemy. This aspect of Operational Maneuver from the Sea will implement sea-based logistics, sea-based fire support and the use of the sea as a medium for tactical and operational movement. Table 2 outlines the key principles of Operational Maneuver from the Sea.

- Focuses on an operational objective
- Uses the sea as maneuver space
- Generates overwhelming tempo and momentum
- Pits strength against weakness
- Emphasizes intelligence, deceptions, and flexibility
- Integrates all organic, joint, and combined assets

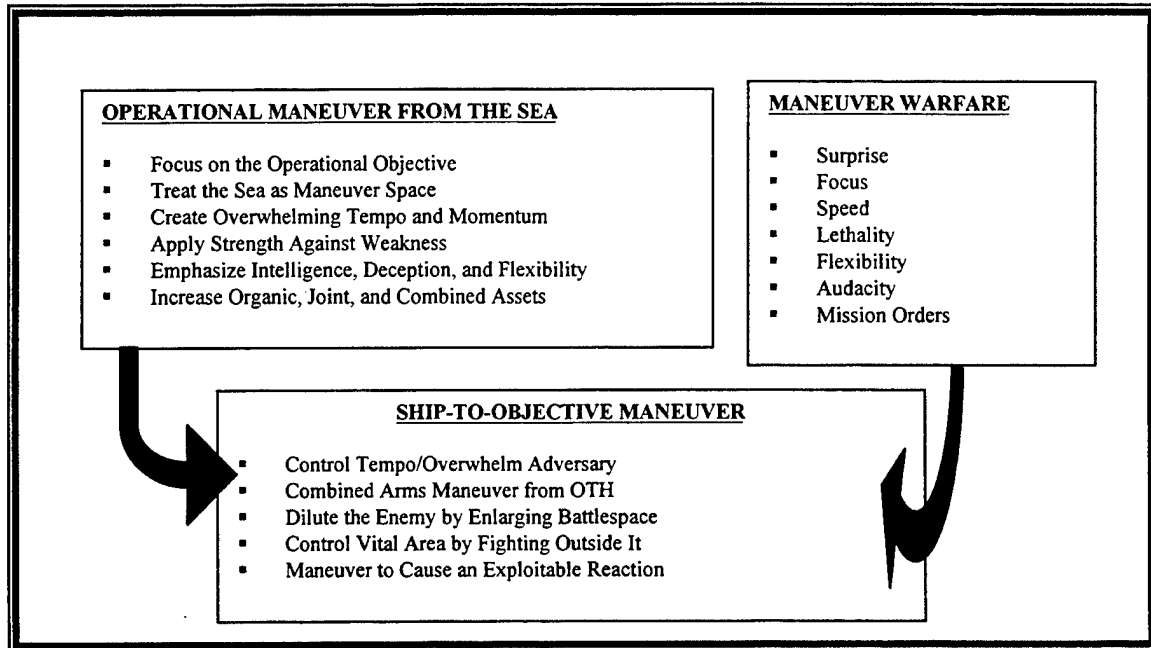
**Table 2. Principles of Operational Maneuver from the Sea (From Ref. 4)**

## **2. Ship-to-Objective Maneuver**

Operational Maneuver from the Sea requires new tactical concepts for amphibious operations. Successful execution of operational maneuver from the sea demands that the landing force maintain the momentum gained by maneuver at sea. These operations will be accomplished by converting the littorals into the enemy's vulnerable flank. Emerging technologies represented by the Advanced Amphibious Assault Vehicle (AAV), MV-22

aircraft, global positioning system (GPS), and developing command and control systems will radically alter the nature of amphibious operations. Ship-to-Objective Maneuver is the new tactical concept for conducting amphibious forcible entry.

Ship-to-Objective Maneuver employs the concepts of maneuver warfare to project a combined arms force by air and surface means against inland objectives. Landing forces will exploit advanced technologies that will permit combined arms maneuver from over-the-horizon attack positions directly to inland objectives. Ship-to-Objective maneuver is not aimed at seizing a beach, but rather concentrates on thrusting combat units ashore to a decisive place and in sufficient strength to accomplish the mission. Figure 1 depicts the integration of the principles of Operational Maneuver from the Sea, Ship-to-Objective Maneuver, and those of maneuver warfare.



**Figure 1. Ship-to-Objective Maneuver (From Ref. 5)**

## **B. THE EXTENDED LITTORAL BATTLESPACE**

### **1. Background**

Extending the Littoral Battlespace (ELB) incorporates the concepts of Operational Maneuver from the Sea, Ship-to-Objective Maneuver, and Joint Vision 2010. The Office of Naval Research (ONR) established the Advanced Concepts Technology Demonstrations (ACTD) for ELB from a Broad Agency Announcement dated May 7, 1997. The Office of Naval Research and the Marine Corps Combat Development Command jointly manage the program. The Commander in Chief, United States Pacific Command (USCINCPAC) is the operational sponsor. The five Critical Operational Issues (COIs) determined by USCINCPAC for ELB are identified in Table 3.

- Can ELB technologies greatly expand the JTF/naval forces' capabilities to conduct over-the-horizon collaborative planning and coordination that integrates all necessary elements into a seamless environment (network)?
- Can a deployed Commander, Joint Task Force (CJTF), through enhanced situational understanding and unprecedented battlespace dominance, exercise command and control over disaggregated joint and/or combined early entry forces to shape and control the littoral area in ways not possible today?
- Can an embarked, dispersed task force staff provide sufficient real-time information to dramatically increase early entry force effectiveness while reducing force vulnerability?
- Can an afloat joint task force provide sufficient massed fire support to early entry forces to fulfill the requirements of over-the-horizon call for fire?
- Can early entry expeditionary forces, through the application of advanced technology and concepts, rapidly prepare the battlefield for movement of command and control ashore and the transition to follow-on forces?

**Table 3. ELB Critical Operational Issues (From Ref. 6)**

## **2. Objectives**

The objective of the ELB ACTD is to demonstrate the military utility of a revolutionary concept for joint expeditionary warfare enabled by advanced technologies. [Ref. 7] The objectives of the ELB project are synergistic with the vision of Network Centric Warfare in which operational advantage is achieved from a strong networking of a well-informed but geographically dispersed force. Program objectives will be achieved through a series of limited technical experiments leading up to two major operational demonstrations. A Marine Expeditionary Unit (MEU) size element comprising of five to ten ships, thirty armored vehicles, thirty fixed/rotary wing aircraft, and two thousand Marines will be used for the demonstrations. The capabilities must be scalable up to a Marine Expeditionary Brigade (MEB).

ELB ACTD '99 took place in April 1999 off the coast of San Diego, California. The objective of this ACTD was to demonstrate a system that integrates the core capabilities of Communications, Command and Control, Sensing, and Fires and Targeting. The system must demonstrate its overall military utility and display a user-friendly operating environment. ELB ACTD 2001 will build upon the results and developments of ACTD '99.

## **3. Concept of Operations for Network Support**

The ELB demonstrations exploit the operational concepts of Operational Maneuver from the Sea and Ship-to-Objective Maneuver. They seek to demonstrate a seamless command structure between afloat and ashore units. The communications

infrastructure needed to support the ELB concept requires reliable network connectivity at ranges that far exceed line-of-sight. One cannot rely on the existence of commercial terrestrial communications infrastructure. It may not exist or, if it does, the adversary may be able to selectively disable service. Consequently, the ELB ACTD has embraced the concept of employing a wireless network that reaches from the Combat Operations Center on Navy ships to forward-deployed Marines via one or more airborne relays. This is analogous to the classic internet architecture that provides for flexibility and scalability. The relay platforms chosen for the demonstration were two Navy P-3s and a commercial Crownair aircraft; however, for an operational system other platforms including helicopters and high altitude Unmanned Aerial Vehicles (UAVs) will be considered. Figure 2 depicts the communication network that will be utilized.

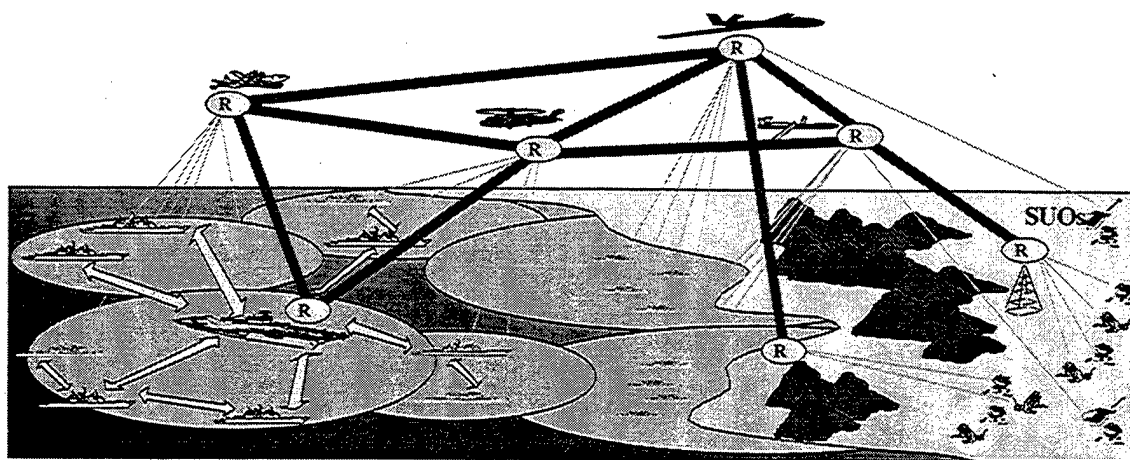


Figure 2. ELB Communication Network (From Ref. 8)

#### 4. Network Objective

The network objective for the ELB ACTD was to provide the wireless communication network that is required to support operational goals. It is synonymous

with providing the high performance information grid that is essential to the successful implementation of Network Centric Warfare. Although communication networks to support ELB exist on land and large ships via satellite links, a suitable extension of this network into the tactical battlefield cannot exist without the prior establishment of a large terrestrial infrastructure. This is contrary to the concept of Operational Maneuver from the Sea. Needed here is a highly dynamic, multiply connected wireless network that supports the mobility of a force as well as the mobility of the relay platforms and the changes in network topology that this mobility introduces. The organization and reorganization of the wireless network topology should be automatic and without human intervention. The desired qualities of the extended wireless network are identified in Table 4.

- Ability to support point-to-point, multicast, and broadcast packet-switched communications among large and small capacity users over distances up to three hundred miles.
- Ability to support point-to-point and group voice service across the entire extended battle space.
- Ability to include service to Marines and dismounted soldiers with battery-powered radio and computer at rates of at least 64 kilobits per second (kbps).
- Ability to include service to large users at rates up to 1.5 Megabits per second (Mbps).
- Ability to automatically configure and reconfigure the network topology and routing/switching databases as both users and airborne platforms move.

**Table 4. Desired Qualities of the Extended Wireless Network (From Ref. 9)**

### **C. EXTENDED LITTORAL BATTLESPACE SYSTEMS**

Two types of communication equipment were used to build the ELB network. Lucent Technology's WaveLAN products were used as the principal means to communicate between aircraft and individual Marines. WaveLAN was also used to communicate between mobile command posts and forward-deployed Marines. The small size and weight of WaveLAN made it well suited for manpack configuration. Marines were outfitted with portable computer units called End User Terminals (EUTs). The Marconi Aerospace AN/VRC-99A radio was the principal radio for supporting the long-range links between large nodes such as ships, aircraft, and instrumented vehicles. The primary components of the Wireless Wide Area Battlenet (WARNET) are identified in Table 5. Each of these systems is discussed in detail in the following sections.

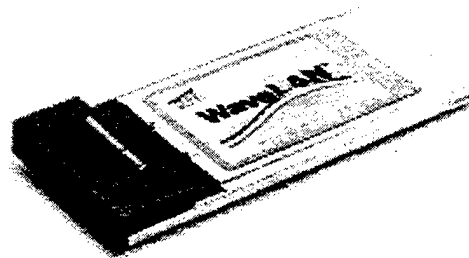
- |  |
|--|
| <ul style="list-style-type: none"><li>▪ WaveLAN II wireless cards in any computer, such as the End User Terminal (EUT) or a desktop version.</li><li>▪ WavePOINT wireless access points connected to ground, air, and sea network routers.</li><li>▪ AN/VRC-99A network radios to provide ground, air, and sea access points for VRC radio nets and connection to network routers.</li></ul> |
|--|

**Table 5. Components of the WARNET (From Ref. 6)**

#### **1. WaveLAN/IEEE**

WaveLAN is a wireless system that offers end users connectivity to network services supporting voice, data, and message traffic. The latest WaveLAN product, known as WaveLAN/IEEE provides a wireless network interface to any computer via an ISA card or a PCMCIA card. WaveLAN meets the Institute of Electrical and Electronic

Engineers (IEEE) 802.11 standard. WaveLAN/IEEE cards have a pair of antennas embedded directly into the card and have a miniature connector to allow substitution of external main (transmit/receive) and auxiliary (receive only) antennas. The extended ranges associated with the ELB ACTD required WaveLAN to be modified to apply a higher power to the antenna. Figure 3 is a WaveLAN card.



**Figure 3. WaveLAN Card (From Ref. 10)**

WaveLAN uses a Direct Sequence Spread Spectrum (DSSS) modulation technique to meet the regulations for unlicensed use in the Industrial, Scientific, and Medical (ISM) frequency band at 2.4 GHz. The channel access protocol for WaveLAN/IEEE is Carrier Sense, Multiple Access with Collision Avoidance (CSMA/CA) as specified by IEEE 802.11. [Ref. 11] Within a single channel, all WaveLAN participants share the channel by the CSMA time-sharing process. Only one transmitter is intentionally active at any one time; otherwise, a collision will occur and a retransmission will be required. Multiple computers can exchange data in a wireless local area network by employing a WaveLAN interface card at each computer. Using the IEEE 802.11 CSMA/CA protocol, the exchange is very analogous to a wireless Ethernet.



[Ref. 11] A transmission by any one unit is expected to be heard by all other units. This supports both collision avoidance and broadcast.

The introduction of mobility, however, generates a problem. When a node moves out of communication from the other nodes, both the broadcast and collision avoidance properties fail to be satisfied across the entire network. [Ref. 6] A solution to this mobility problem is to use a WaveLAN access point operating under the Request-to-Send/Clear-to-Send (RTS/CTS) protocol. [Ref. 9] The CSMA/CA protocol is still used to control the RTS and CTS messages. The RTS/CTS protocol was used for the ELB ACTD.

The current WaveLAN card supports two data rates: 1 Mbps and 2 Mbps. Future upgrades are expected to support higher rates of 5.5 and 11 Mbps. [Ref. 10] Each WaveLAN link senses existing error statistics and adjusts its data rate to one of the available rates. All signaling is done at the 1 Mbps rate so that headers can be read without dependence on data rate. [Ref. 10]

## **2. WaveLAN Access Point**

A standard WaveLAN access point is called a WavePOINT. A WavePOINT is a small, compact, wireless-to-wireless and wireless-to-ethernet bridge. A WavePOINT is normally used to provide connectivity between a wired or fiber network and one or more WaveLAN wireless interface units. [Ref. 12] It provides two wireless WaveLAN interfaces and an Ethernet interface. The Ethernet interface can be connected to a wide-area network via a router. When a WavePOINT is used with two wireless interfaces,

each interface is usually operated in a maximally separated RF band, and the antennas are separated to achieve as much isolation as possible. Ordinarily the Ethernet interface is used to interconnect multiple access points. However, one of the wireless interfaces can be used on each access point to provide wireless network connectivity among multiple access points. [Ref. 12] WavePOINT provides network access and extended Over-the-Horizon coverage by bridging together access points. The ELB ACTD used this method of connectivity. This allows a mobile user to move from one access point to another with a clear hand off. This is only valid when a user remains within a subnet. Roaming AP's create addressing problems that are still being studied within the private and DoD sectors. Dynamic roaming AP's were not addressed in this thesis. Figure 4 is a WavePOINT.

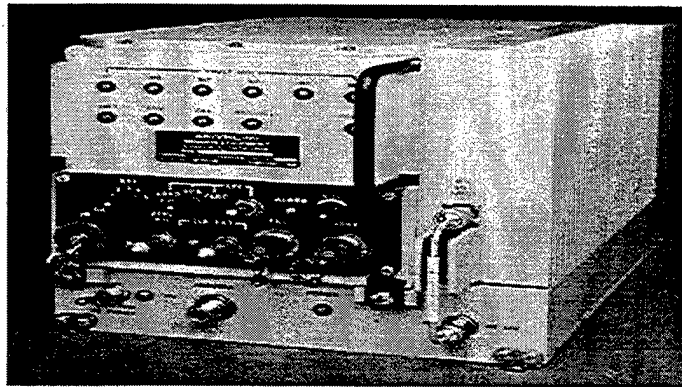


**Figure 4. WavePOINT (From Ref. 12)**

### **3. AN/VRC-99A**

The VRC-99A is a militarized radio offered by Marconi Aerospace. It can be provided in ground vehicular, shipboard, and airborne configurations. The AN/VRC-99 is a programmable communications system and can provide virtual connectivity and datagram service guaranteeing reliable, simultaneous, multichannel voice, data, and image and video transmission. [Ref. 13] It uses a specialized direct sequence, spread

spectrum waveform to provide antijam and low-probability-of-intercept features, and has an embedded Type-1 encryption feature. Channel access can be controlled by a variety of Time Division Multiple Access (TDMA), Frequency Division Multiple Access (FDMA), and Code Division Multiple Access (CDMA) techniques. VRC-99A radios can form a communications network capable of transferring data from host computers or groups of host computers connected in a Local Area Network (LAN) to remote hosts or remote LANs. The VRC-99A has an embedded IP gateway that functions as a primitive router and provides interfaces to Ethernet, RS-242 serial bus, and the wireless medium. It can provide wireless LAN service for both line-of-sight (LOS) and beyond line-of-sight (BLOS) data and/or voice links. Adaptive routing provides for network survivability in the most challenging of dynamic mobile subscriber applications. It was used as the primary network distribution backbone in ELB. Figure 5 is an AN/VRC-99A.



**Figure 5. AN/VRC-99A (From Ref. 13)**

THIS PAGE INTENTIONALLY LEFT BLANK

### **III. NETWORK MODEL DEVELOPMENT**

#### **A. MODELING AND SIMULATION**

This chapter explores the use of modeling and simulation as a tool in understanding and evaluating the network architecture utilized in the ELB demonstration and the impact of CID information requirements. A model has been developed and tested using a PC based, object oriented modeling and simulation tool called Extend™ developed by Imagine That, Incorporated. Extend is an easy to use graphical simulation tool that allows a user to model complex discrete or continuous systems while varying performance parameters. [Ref. 14]

##### **1. Background and Terminology**

A model is a logical description of a system and its performance characteristics. A model can be used to describe how a real-world activity will perform. Simulations are accomplished through the development of a model that is representative of a system, conducting experiments on that model through time, and finally measuring the behavior of the model under different conditions. Instead of interacting with a real system, you create a model that corresponds to it. The model, however, must provide a reasonable fidelity to the reality it is simulating. The use of models allows an organization to test a system at a fraction of the cost it would require to create the actual physical system. One of the principal benefits of a model is that you can begin with a simple approximation of a process and gradually refine the model as your understanding of the process improves.

[Ref. 14] Simulation promotes the evaluation of ideas and identification of inefficiencies before the investment of large amounts of capital and resources. This is extremely beneficial in the development of any new system. Some additional benefits of simulation are to gain insight and stimulate creative thinking toward a concept; identify problems before implementation; confirm all variables; and to strengthen the integrity and feasibility of a concept. [Ref. 15]

## **2. Extend Software**

Extend was chosen because it is a popular tool for high level, concept design. Extend requires only a 486, or Pentium Pro computer and runs on Windows 3.1, 95, 98, or NT. [Ref. 14] However, as complex models are developed, the performance of the simulation becomes dependent on hardware and software specifications. It is user friendly and comparatively inexpensive. Extend is used extensively by Navy organizations conducting research in over the horizon communication concepts. [Ref. 14] The software uses pre-built object blocks that are the foundation of an Extend model. These pre-built objects emulate user-selected functions, actions, and processes of the model.

Represented by icons, blocks are assembled by “dragging and dropping” from the Graphical User Interface (GUI) tool bar to the working space. The user then connects the blocks in a logical order, or desired sequence. The performance parameters and behaviors of each block are entered through a dialog page specific to that block. As the model becomes larger and more complex, the user can group blocks together and form a

hierarchical block. The creation of hierarchical blocks significantly reduces the confusion of a complex model and aids in the understanding of the basic principles of the model and the associated system under development. Simulation results are displayed using graphs, tables, sensitivity analysis, and user-developed notebooks for input and output of performance data. [Ref. 14]

### **3. Design Steps**

Network activities are event driven; therefore, discrete event simulation is the design basis for the models in this study. The following design sequence was implemented: analyze the physical communication architecture utilized in the ELB demonstration; develop and build the model through a stepwise, iterative process that includes representation of links, nodes, and interfaces; run the simulation; analyze the results; and draw conclusions based on the results.

## **B. THE EXTEND MODELS**

The distinguishing factor used to evaluate the model will be the data latency associated with different information loads rather than the basic architecture. This difference is captured through the adjustment of the dialog pages associated with each block. Since the architecture remains the same, it will be explained in detail. After the architecture is explained, the different information requirements will be addressed. The information requirements will consist of a full-scale operational network and CID.

The first step in developing the model was to concentrate on the individual components that make up the communications network used during the ELB

demonstration. This included the AN/VRC-99A and the WaveLAN technology. The initial model developed consisted on one Access Point (AP) and three End User Terminals (EUTs). Once the initial model was completed, it was validated using simulated message traffic and observing the latency associated with each transmission. The same logic utilized for the three EUT access point could then be applied to the development of a multitude of access points, each with a different number of EUTs. For simplicity, the description provided will only address a three EUT access point. The AN/VRC-99A was modeled utilizing Time Division Multiple Access (TDMA) and served primarily as the long-haul communications medium for messages traveling to access points that were beyond the ranges associated with WaveLAN. For example, the VRC-99A links were used as the long-range interconnection among ships and aircraft and from aircraft to HMMWVs. WaveLAN, on the other hand, was used to connect from the aircraft to the EUTs and also to support terrestrial LANs centered on a HMMWV WavePOINT (Access point mounted on a HMMWV). Once these components are created, they can be interconnected to construct communication architectures of virtually any size.

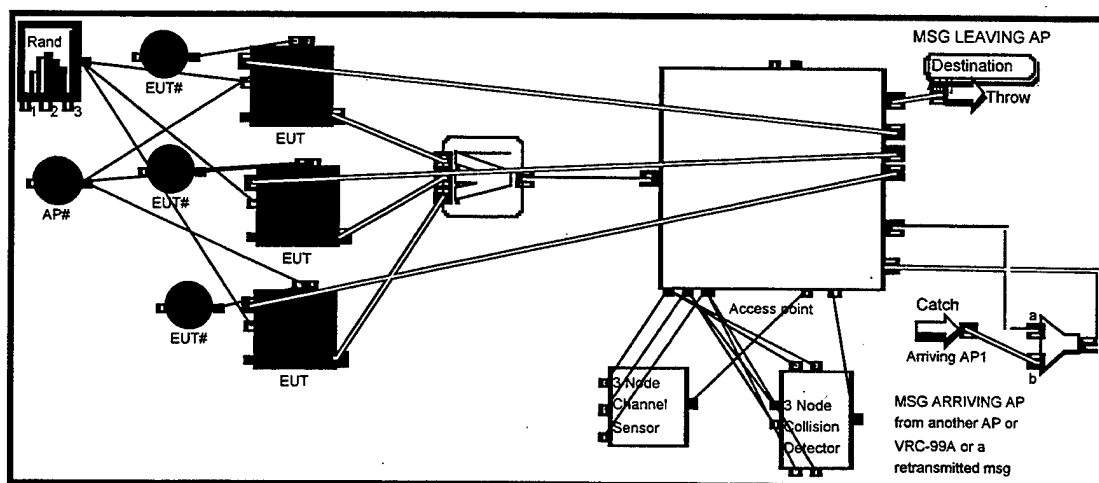
The model descriptions are intended to provide a basic working knowledge of the model, the low-level design details will be omitted, as they tend to be complex and do not provide any additional benefit to the overall understanding of the model. The goal is to provide a general explanation of the model, rather than concentrate on a block-by-block description. The model will begin with a high level view and then proceed with more



detailed explanations as necessary for individual components. Appendix A is the data dictionary associated with the models. Appendix L is the definition of each Extend block utilized in the model.

### 1. Description of a Three EUT Access Point

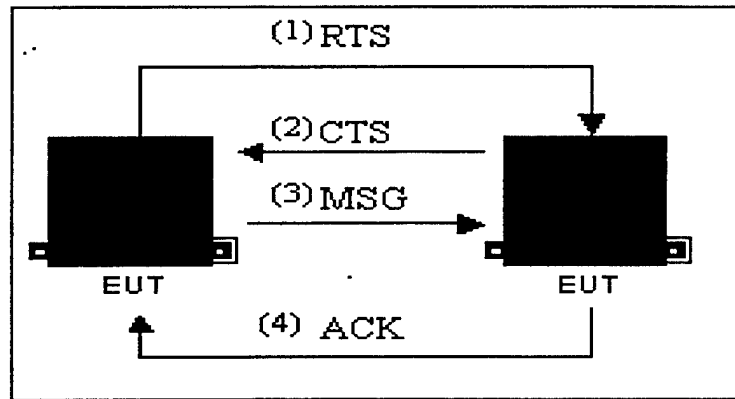
Figure 6 represents a three EUT access point. As depicted, the end user terminals are connected to an access point where there is a sensor and detector to implement the channel access protocol of Carrier Sense, Multiple Access with Collision Avoidance (CSMA/CA) as specified by IEEE 802.11. All message traffic is initiated at the EUT.



**Figure 6. Three EUT Access Point**

To increase the reliability of the network and prevent a possible message collision due to the hidden terminal problem, the additional protocol of Request to Send/Clear to Send is utilized. An EUT will generate an initial RTS and then all subsequent message traffic will be triggered as each different type of message is received.

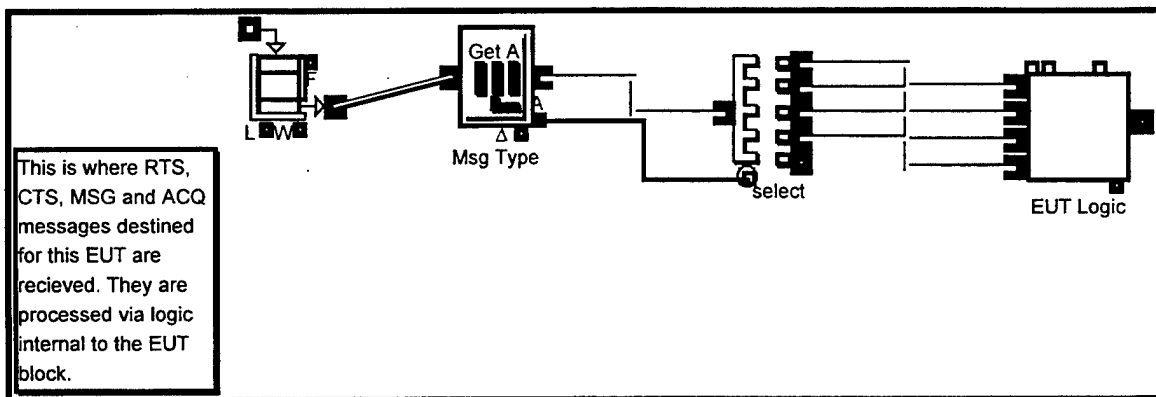
A Request to Send (RTS) initiates a Clear to Send (CTS), a CTS initiates the actual Message (MSG), and a MSG initiates an Acknowledgement (ACK) to complete the process. The CSMA/CA protocol is still invoked to control all the different types of message transmissions. Figure 7 is provided to depict the RTS/CTS protocol.



**Figure 7. RTS/CTS Protocol**

*a. End User Terminal*

Figure 8 is the initial break down of the end user terminal. Within the

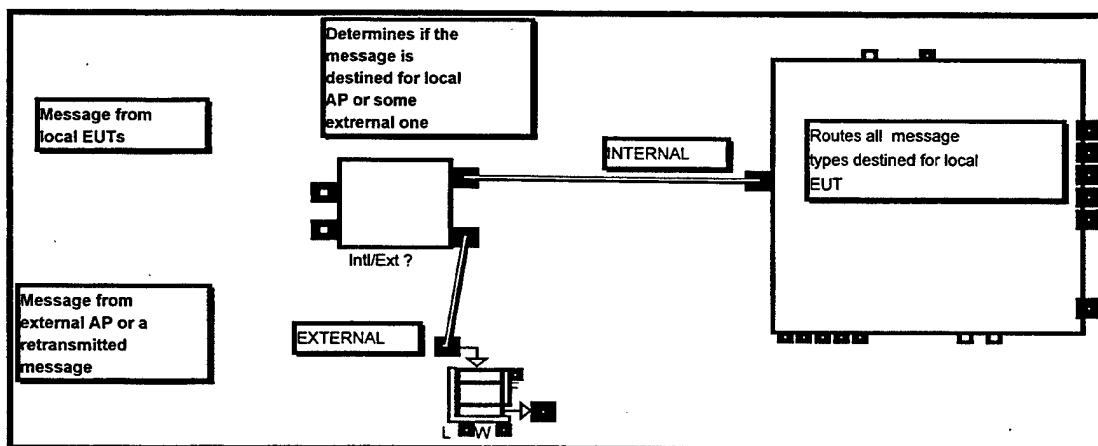


**Figure 8. Initial Break Down of End User Terminal**

EUT logic block, the various types of messages are generated and assigned destination addresses. Therefore, once an EUT receives a RTS, it must have the ability to identify the originator and determine the correct destination address. This is accomplished by assigning attributes to messages as they are generated. It includes, but is not limited to, an Origin EUT, Origin AP, Message Size, and their destination counterparts. The EUT logic is provided in Appendix B. After messages are processed through the EUT, they are routed to the access point.

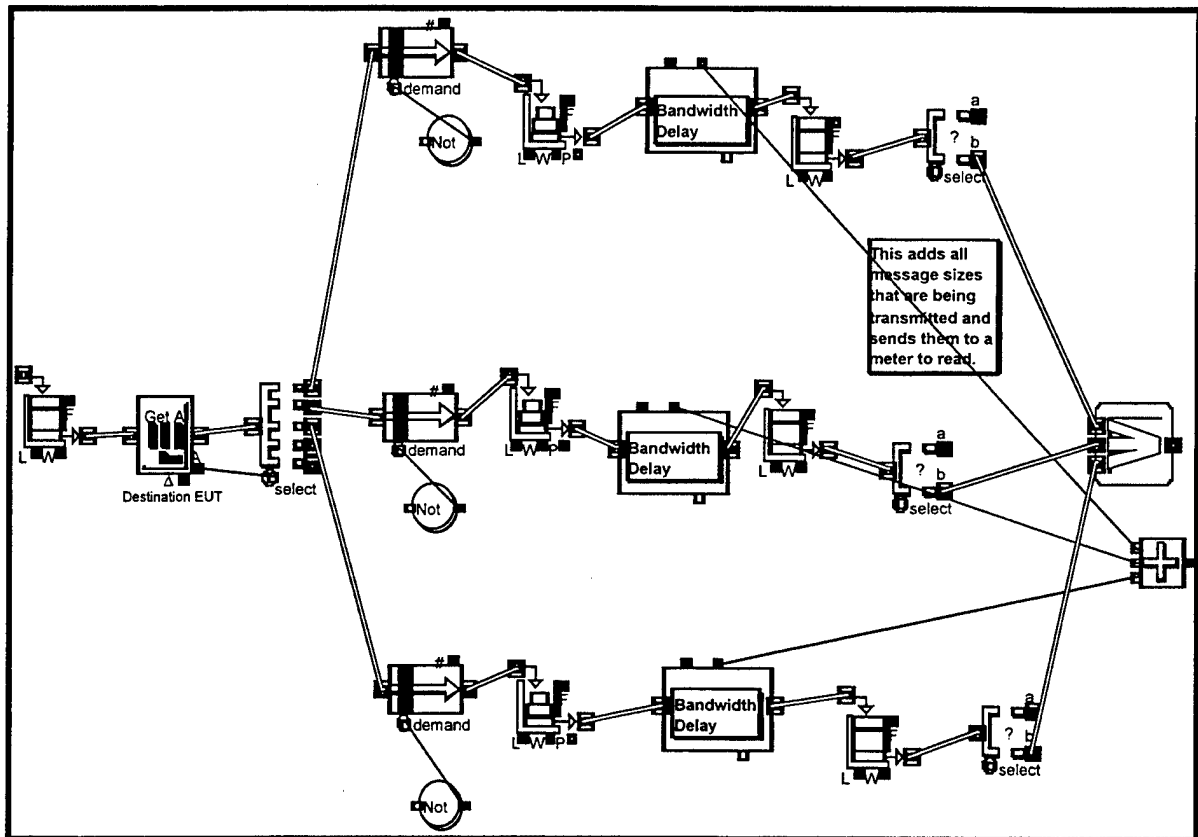
***b. Access Point***

All message traffic generated from an EUT flows through a local access point. This includes messages from a local EUT and messages from external access points. Additionally, all messages that collide are retransmitted through the access point. Once a message is inside the access point, the destination address of the message is determined to be either internal or external to the access point. Figure 9 depicts this basic process. External messages are routed to another access point or a VRC-99A based on



**Figure 9. Internal/External Component of Access Point**

the routing table and network configuration. The logic of the internal/external decision is provided in Appendix C. Figure 10 depicts the traffic flow of internal messages. Messages are received and then routed to the appropriate EUT. The message then enters a bandwidth delay, which is calculated using the formula of message size divided by bandwidth.



**Figure 10. Flow of Internal Messages within Access Point**

Internal messages must be sensed and detected. Both the sensor and detector work off of the bandwidth delay hierarchical block. If a message is being delayed, the sensor and detector will be transmitted the information. The sensor ensures

that an EUT does not attempt to send a message to a busy EUT; however, there may be an instance when the sensor action is completed simultaneously by different EUTs. This will result in a collision. The detector determines if a collision has occurred. The logic of the sensor is provided in Appendix D and the logic of the detector is provided in Appendix E. If a collision occurs the message has to be retransmitted. A retransmitted message is sent to the identified catch block at the access point, which was previously noted in Figure 6, and then follows the same path through the access point once again.

The next step for a message once it makes it through the access point without undergoing a collision is to determine the type of message (RTS, CTS, MSG, or ACK) and generate the next message in the sequence. This ensures that the RTS/CTS protocol is adhered to. This will continue until a MSG is generated. A MSG follows the steps depicted in Figure 11. All MSG's are further broken down by communication

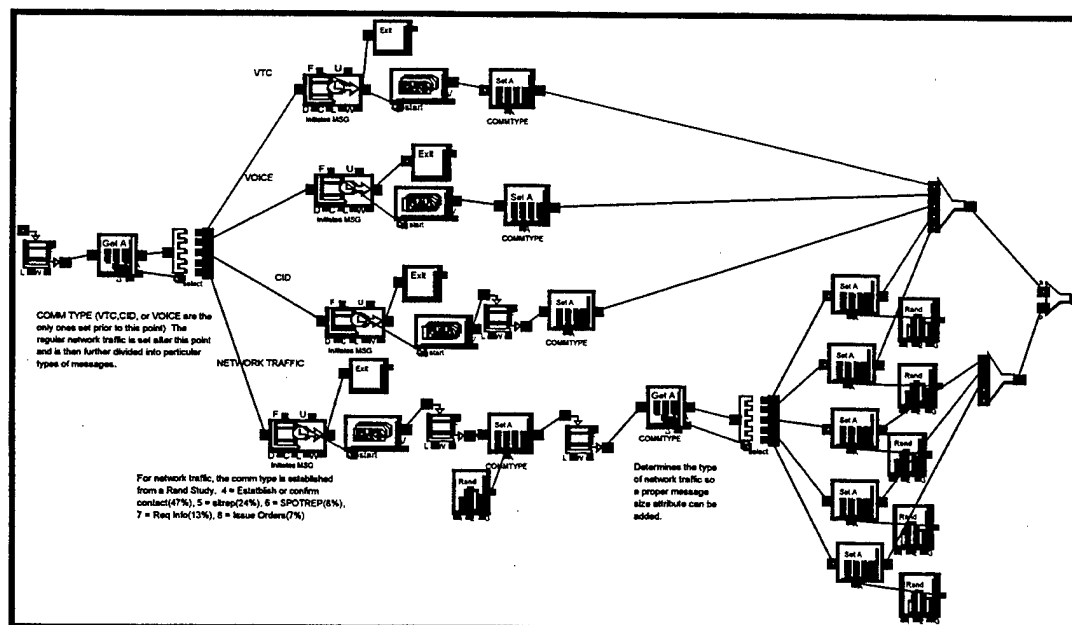
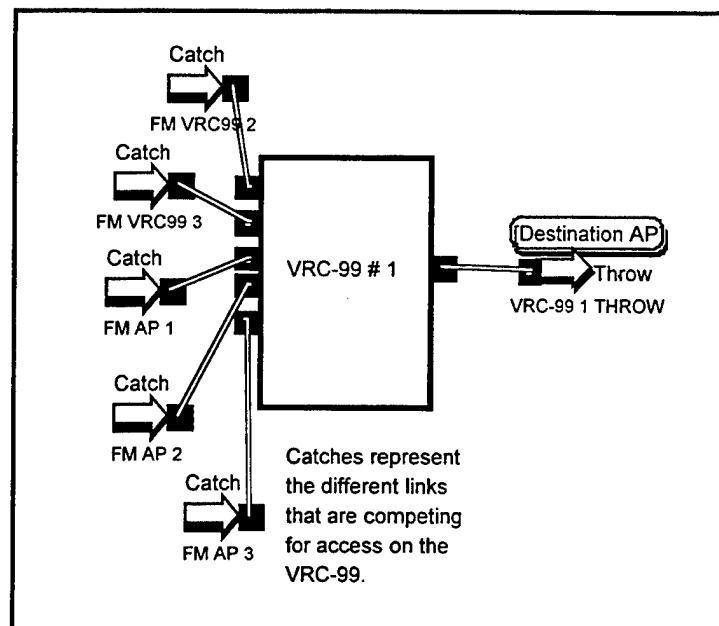


Figure 11. MSG Routing

type. The MSG could be video, voice, CID, or regular network traffic. Once the appropriate communication type is determined, all applicable characteristics of message size, frequency, and priority are assigned. The different types of MSG's will be explained in more detail in Chapter 4 when the information requirements of the network are addressed.

## 2. Description of an AN/VRC-99A

Figure 12 depicts the high level view of the AN/VRC-99A. The AN/VRC-99A



**Figure 12. High Level View of AN/VRC-99A**

was modeled utilizing Time Division Multiple Access. With TDMA, each radio transmits a MSG during a precise time. The catches represent the different links that have been provided a time slot. These initial catches are dependent on the architecture

employed and must be established as the model is developed. The destination of messages as they leave the AN/VRC-99A is also dependent on the architecture. A routing table identifying the next path of a message must be incorporated.

Figure 13 provides the details of the AN/VRC-99A and the implementation of

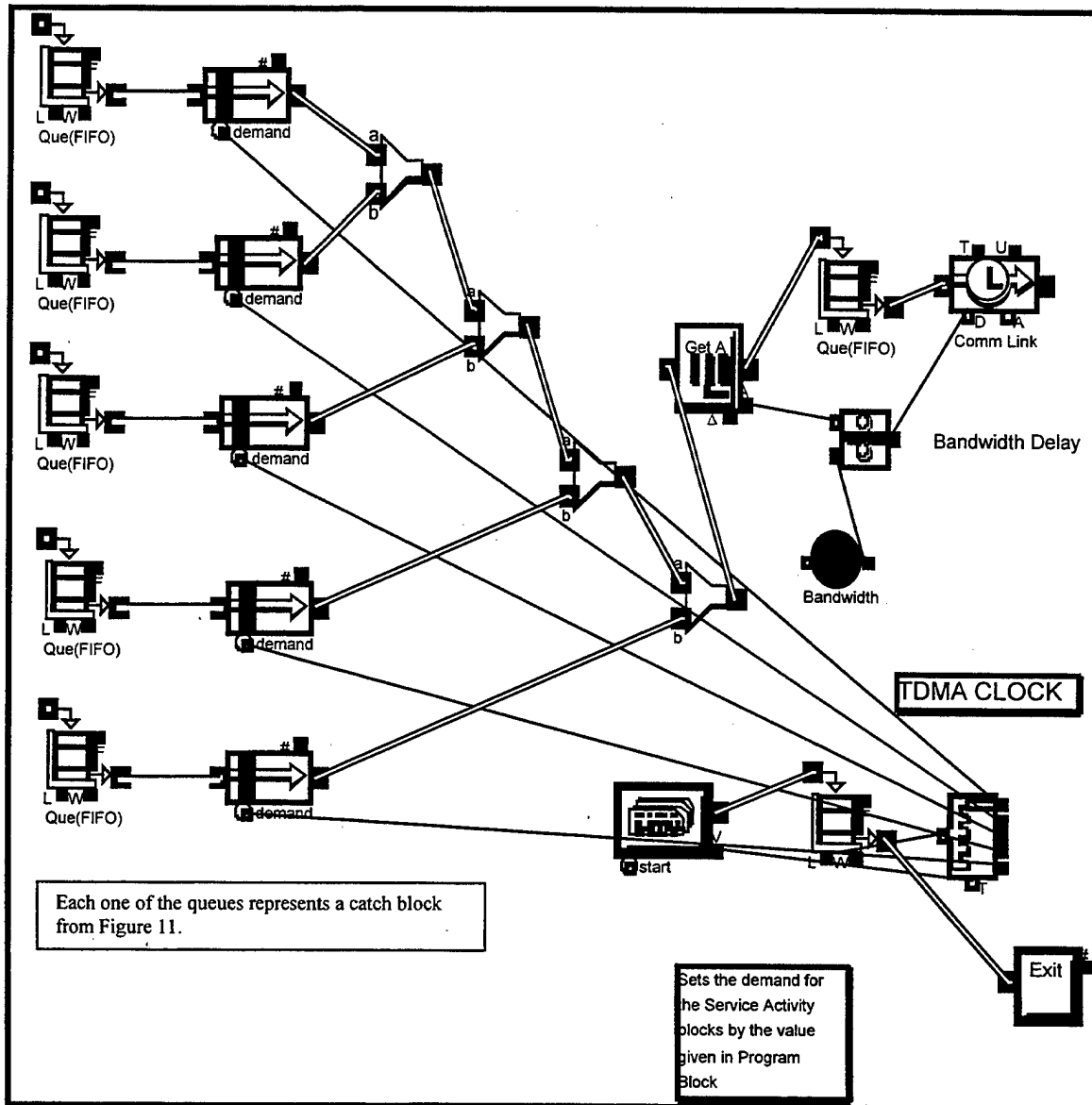


Figure 13. Detailed View of AN/VRC-99A

TDMA. Once a user's allocated time slot is received, access is available to send message traffic. Time slots are determined by dividing the largest message size by the bandwidth. This ensures that the link will stay open long enough to transmit the appropriate message. Each user has equal access to the VRC-99A and can transmit whenever their allocated time slot is available. After a message is released, it travels across the communication link and undergoes a bandwidth delay; utilizing the equation of message size divided by bandwidth.

### 3. Initial Network Configuration

The first network configuration chosen was based on the ELB demonstration. Figure 14 depicts the basic architecture that was modeled. Appendix F is the routing table used to determine the flow of traffic across this network. This topology was used to

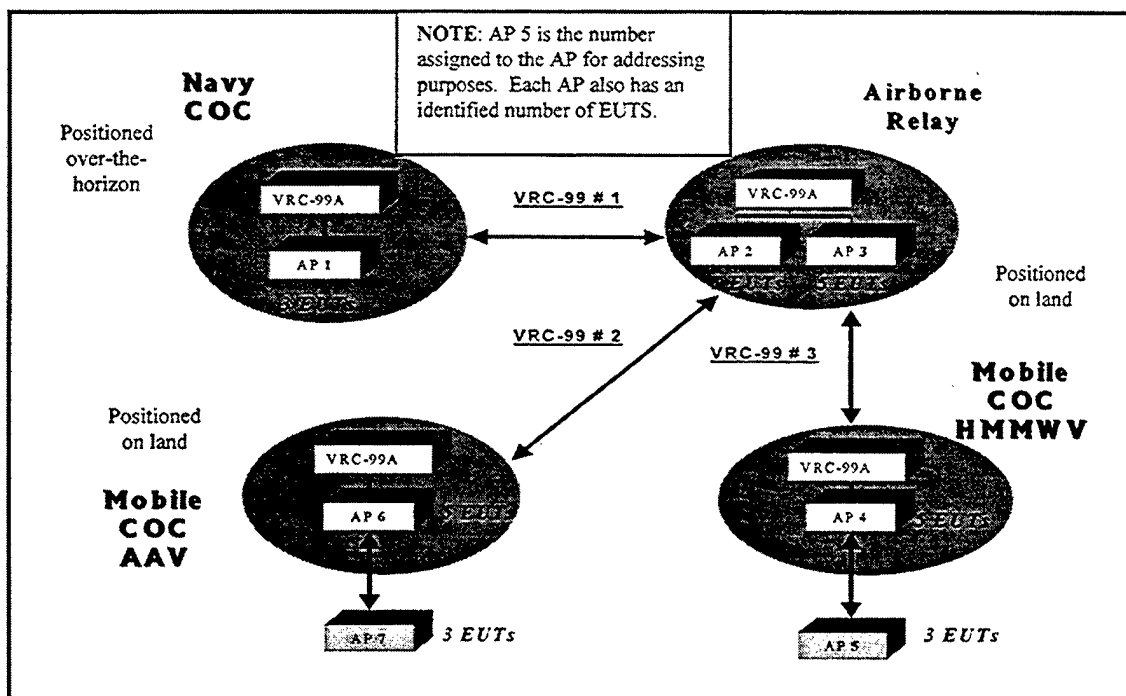


Figure 14. Initial ELB Configuration



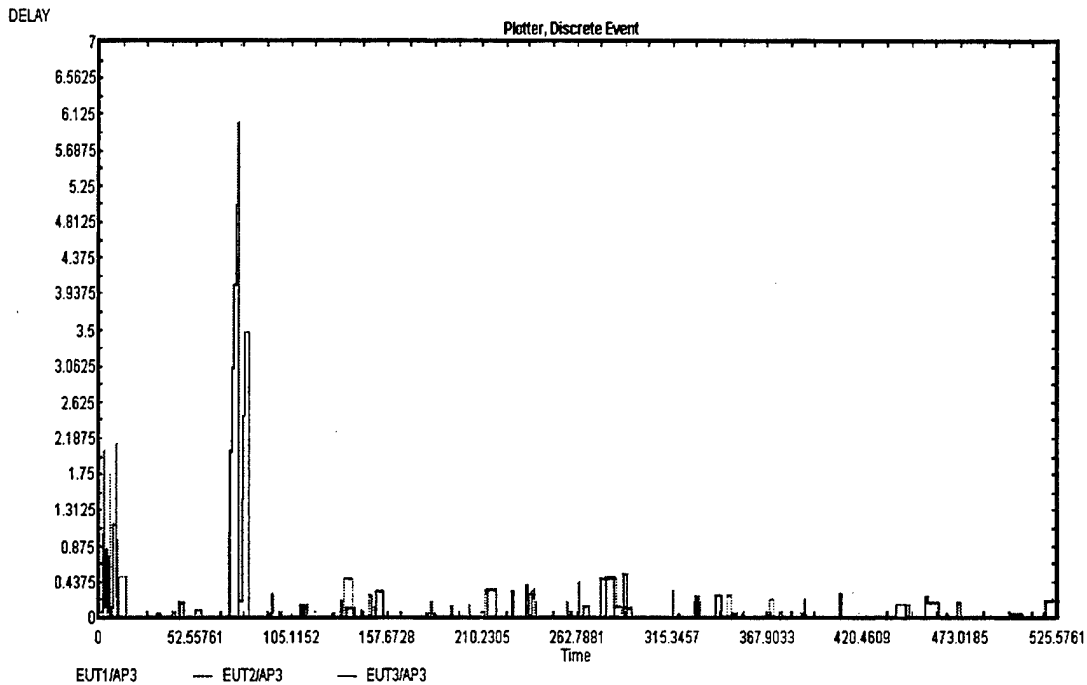
validate the basic network operating characteristics and connectivity between the AN/VRC-99A and the WaveLAN equipment.

The AN/VRC-99A and the WaveLAN access points are connected using a router. There are seven access points and a total of twenty-nine EUTs. A number for addressing purposes identifies each access point. For example, AP 5 is access point number five. Additionally, each access point is assigned a certain number of EUTs. The number of EUTs is listed next to the block representing an access point. To put this diagram into proper perspective and scale, the Navy COC is communicating from over-the-horizon and cannot connect directly to the mobile COCs. Messages must travel through the airborne relay. The AN/VRC-99s represent the long-range links.

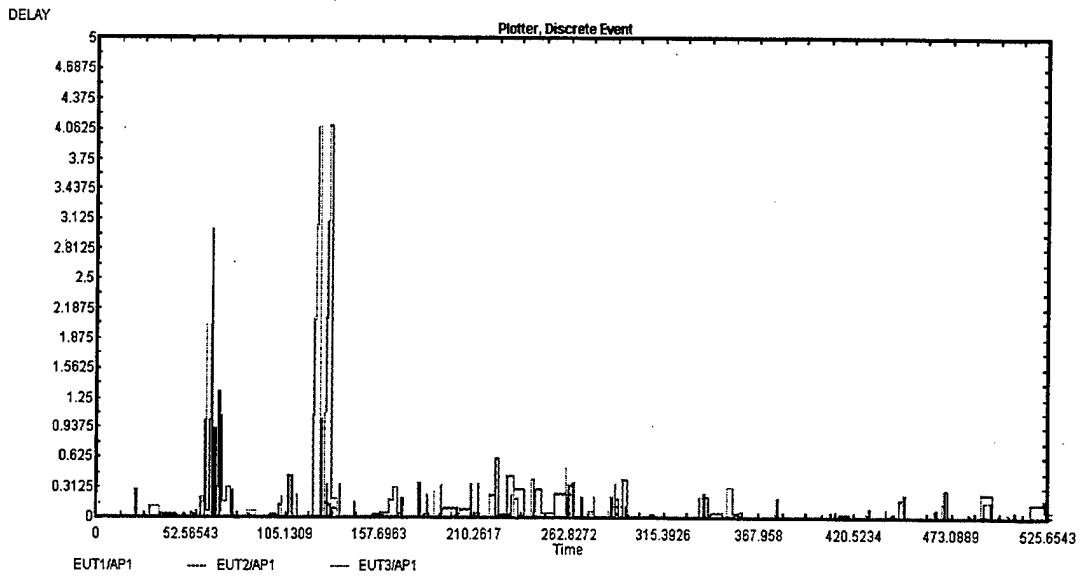
#### **4. Initial Network Test Results**

A simulation was run using the initial network depicted in figure 14. The simulation ran for eight hours (real time), which constituted about 525 seconds of simulation network time. A generic information load was used to test the network. The primary goal of this test was to validate the network operating characteristics and the connectivity between the AN/VRC-99A and the WaveLAN equipment. VTC was introduced at two separate points. The first time took place at the beginning of the simulation and ran for 300 seconds, while the second time was initiated at 100 seconds and concluded at 300 seconds. Figures 15 through 18 show some significant spikes in time delay during the VTC, but tapered off considerably to about .3 to .5 seconds delay. This is consistent with the large bandwidth requirements of VTC, as each message must

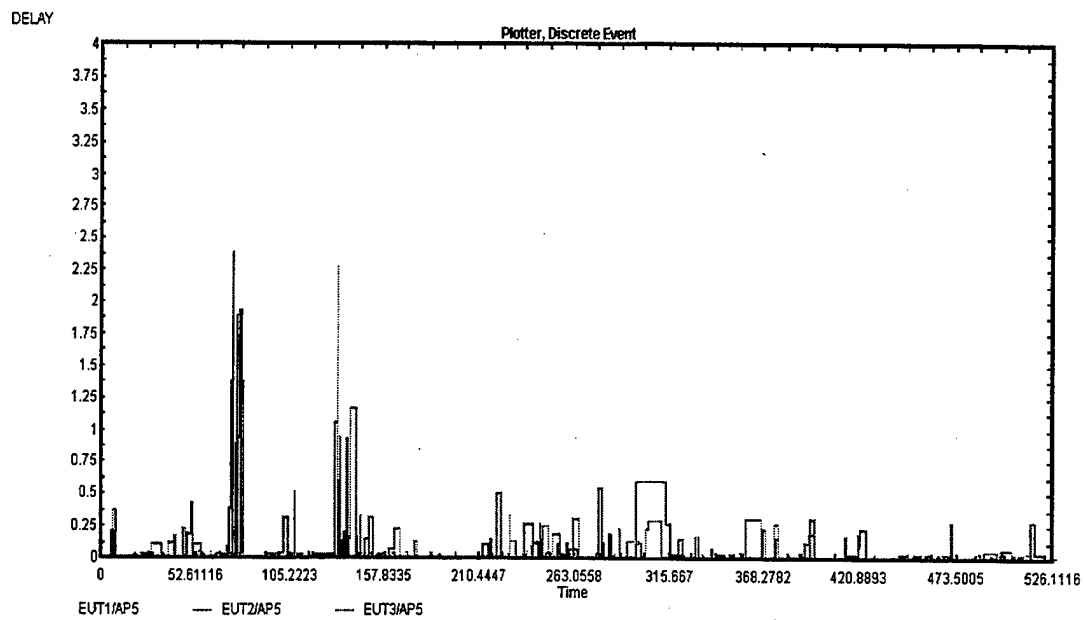
compete for access at the VRC-99A's and the bandwidth delay chokepoints within the access points. All communications that started and ended within a local access point showed a delay equal to the message size divided by the bandwidth. This is consistent with the communications theory. Figures 15 through 17 depict the delays according to time for each EUT within an AP. The vertical axis identifies the delay incurred for each message. The horizontal axis displays the simulation time. A legend is located in the lower half of the plotter and indicates which EUTs are being measured. This is usually in color and can be easily discerned, however, for our purposes it is not necessary to distinguish between them. The most important thing to note from these results is the validation of the network operating characteristics and connectivity of the model.



**Figure 15. Delay within AP 1**



**Figure 16. Delay within AP 3**



**Figure 17. Delay within AP 5**

THIS PAGE INTENTIONALLY LEFT BLANK

## **IV. COMPLETE NETWORK MODEL**

### **A. BACKGROUND**

Since the basic network operating characteristics and connectivity between the AN/VRC-99A and the WaveLAN equipment have been validated, it is now appropriate to begin the process of scaling the model. The key issues in this undertaking are the information load on the network and the size of the force. These issues will be addressed in the following sections of this chapter. Simulations with the scaled model will be used to make the evaluation between a dedicated CID situational awareness network versus including CID information on a full functioning network.

### **B. SIZE OF FORCE**

The focus of this effort centered on a Marine Expeditionary Brigade (MEB). A MEB is a Marine Air-Ground Task Force (MAGTF) that effectively integrates ground and air forces. It is capable of projecting power ashore against all forces of resistance and operating within the entire spectrum of armed conflict. This approach was based on the strength requirements identified in the Center for Naval Analysis document Project Culebra: Establishing the MEF (afloat) in 2010. [Ref. 21]

The four elements of the MEB are a Command Element (CE), Aviation Combat Element (ACE), Ground Combat Element (GCE) and Combat Service Support Element (CSSE). The units chosen are not all inclusive, but rather attempt to provide a general

characterization of a MEB sized force. Table 6 identifies the various units for each of these four elements.

<b>ELEMENT OF A MARINE EXPEDITIONARY BRIGADE</b>	<b>UNIT NAME</b>
Command	HQ MEB
Command	HQ Regiment
Command	Truck Co
Command	Comm Co
Ground Combat	Infantry Bn X 3
Ground Combat	Infantry Co X 9
Ground Combat	Artillery Bn
Ground Combat	Force Recon
Ground Combat	AAV Plt X 3
Ground Combat	Tank Plt X 3
Ground Combat	Eng Plt X 3
Ground Combat	LAR Plt X 3
Aviation	HQ MAW
Aviation	LAAD Det X 3
Aviation	Miscellaneous
Aviation	AH-1W Cobras
Aviation	AV-8B Harrier
Combat Service Support	MED Bn
Combat Service Support	MT Bn
Combat Service Support	LSB Bn
Combat Service Support	ENG Bn
Combat Service Support	SUP Bn
Combat Service Support	MAINT Bn

**Table 6. Units of a MEB (After Ref. 21)**

The close-air support assets of the aviation combat element need to be addressed separately. These assets include the AH-1W Cobras and AV-8B Harriers. It is assumed that no more than three Cobras and three Harriers will be actively involved in combat operations at any one time. Additionally, these assets will not be configured to communicate to all the units on the ground, but will rather utilize their inherent capability of the Joint Tactical Information Distribution System (JTIDS) to exchange CID information. This link will be modeled utilizing a modified EUT.

### **1. MEB Force Structure**

Initial modeling and scalability consisted of determining the number of communication links along with the number of Access Points (APs) and End User Terminals (EUTs) needed to sustain a MEB sized force. The ship-to-shore communications utilized an Airborne Relay, via VRC-99A radios to each of the Force Reconnaissance Companies, the Marine Expeditionary Brigade (MEB) Headquarters (HQ) and the Regimental Landing Team (RLT) HQ. The MEB HQ and the RLT HQ were the primary nodes that maintained communications with the COC afloat. The scaled simulation model represents these Headquarters with Access Points consisting of ten EUTs. The model also represents the Force Reconnaissance Companies with APs consisting of three EUTs. The MEB and RLT Headquarters APs support communications links to three Infantry Battalions, six Combat Service Support Units, and an Artillery Battalion all via VRC-99A radios. The simulation model represents each of the Infantry Battalions with ten EUTs and the Artillery Battalion with five EUTs. The

model also represents the six Combat Service Support Units with APs consisting of three EUTs.

Both the MEB and the RLT COC's APs support wireless communications via WaveLAN to each of the three following unit's headquarters: Truck Company, Communications Company, and Maintenance Company. Each of the Infantry Battalion APs supports three Infantry Company APs via WaveLAN. All Infantry Company APs have five EUTs. The Infantry Company supports communication links to five APs belonging to the following units: AAV, LAAD, Tanks, Engineers, and LAR. Each of these units' APs consists of three EUTs. Although this scaled model will not fit each and every deployed MEB force structure and the numbers of EUTs and APs may vary, this model does capture the majority of the MEB structure needed to operate under OMFTS in an ELB environment.

Figure 18 is provided to depict a snap shot of the basic architecture and network configuration chosen for the final model. This structure is in compliance with the assumptions outlined above, long with the current C4I structure utilized throughout Marine Forces. All the units identified in Table 6 are included. To put this diagram into proper perspective and scale, the Navy COC is communicating from over-the-horizon and cannot connect directly to any unit. Messages must travel through the airborne relay. The AN/VRC-99s represent the long-range links. Appendix H is the routing table used to determine the flow of traffic across this network. Appendix G is the probability distribution used to identify potential destinations for a message leaving an access point.



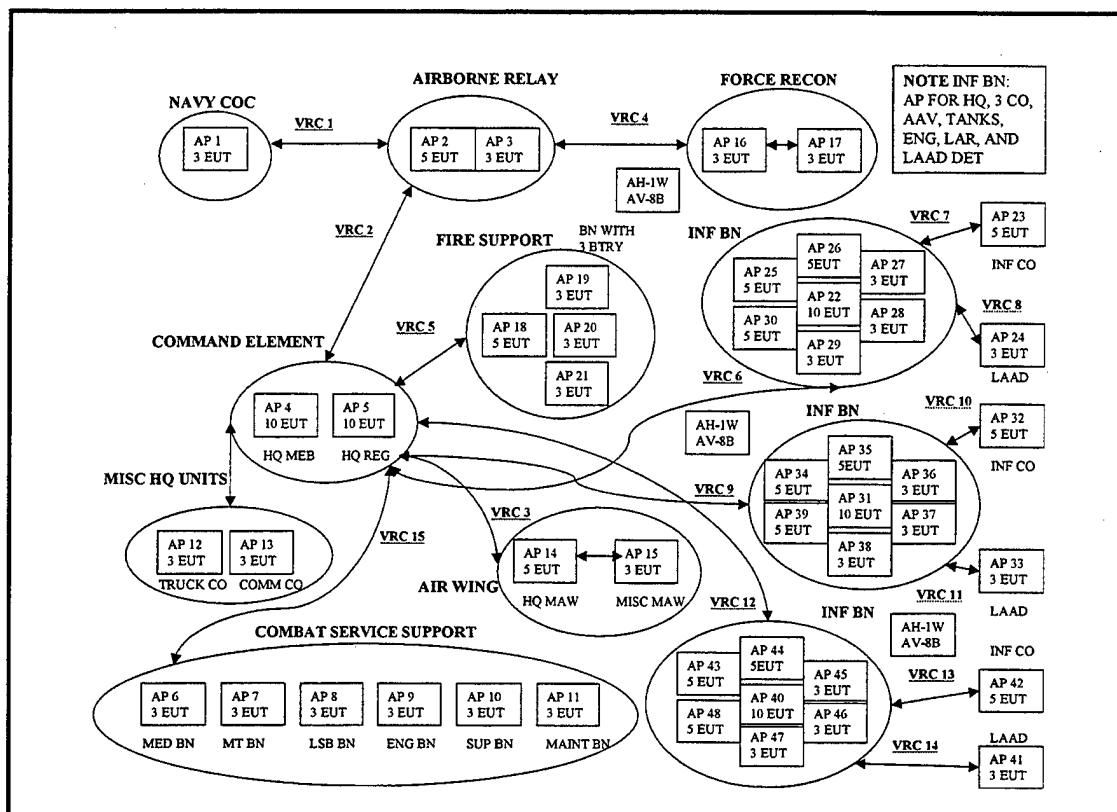


Figure 18. MEB Architecture

This distribution was limited to reflect a realistic scenario of communication requirements.

### C. INFORMATION REQUIREMENTS FOR A FULL-SCALE NETWORK

The information requirements for this network are the determining factors in evaluating the scalability of the model and the possible successful application of this technology. Additionally, this information is critical in determining the most effective solution between a dedicated CID situational awareness network versus including CID information on a full functioning network.

The C4ISR architecture developed for OMFTS established an information exchange matrix. [Ref. 16] This matrix is provided as Table 7. This matrix may seem to

ACTIVITY	SOURCE NODE	DESTINATION NODE	DESCRIPTION
Any task or activity.	Any node.	Any or all nodes or groups of nodes.	Digitized voice, text, or binary data. Video if bandwidth permits.

**Table 7. OMFTS Information Exchange Matrix (From Ref. 16)**

place an unreasonable burden on the network; however, it actually constitutes a simplifying assumption that greatly reduces the challenges and risks associated with architecting the network. This matrix served as the foundation for the development of the full-scale network information requirements.

The next step in determining the full-scale network information requirements was to attach specific message types, sizes, and frequency to the very broad description provided in the OMFTS Information Exchange Matrix. This was accomplished for each of the general categories of digitized voice, video, and text or binary data.

A limited number of nodes will have access to video utilizing the 512,000 bps data rate. Video will be conducted two times a day for six minutes. All EUTs were equipped with the capability for voice. Voice links were established utilizing the 2,400 bps data rate and were conducted by each EUT for ten seconds every thirty minutes. This message load assumes that voice will only be used for coordination and will not replace conventional voice communications. Table 8 summarizes this information.

	VOICE	VIDEO
<b>Data Rate</b>	2,400 bps	512,000 bps
<b>Frequency</b>	10 seconds every thirty minutes	2 times a day for six minutes
<b>Number</b>	All EUTs	2 nodes

**Table 8. Voice and Video Information Requirements**

The remainder of the architectural message loading was addressed separately. This is due to the extensive array of possible messages, each having the potential to vary in size and frequency. A sufficient load was derived from a combination of both the Department of Defense Interface Standard and a RAND study.

The RAND study analyzed transmissions of a tactical command net. The study categorized transmissions into five message types and provided the percentages of transmission for each type. [Ref. 17] The messages identified are the most likely to be implemented within a military communications network. Table 9 provides this information.

TYPE OF MESSAGE	PERCENTAGES OF TRANSMISSION
Establish or Confirm Contact (Analogous to topology data)	47%
SITREP	24%
SPOTREP	8%
Request Information	13%
Issue Orders	7%

**Table 9. Message Types and Percentages of Transmission (From Ref. 17)**

The DoD's Variable Message Format (VMF) Technical interface Design Plan was used to determine the message length for each type of message. [Ref. 18] VMF is designed as a common means of exchanging data across a joint interface between combat units at varied echelons. The size of each type of message is identified in Table 10.

TYPE OF MESSAGE	SIZE OF MESSAGE (BITS)
Establish or Confirm Contact	500
SITREP	1600
SPOTREP	2000
Request Information	2000
Issue Orders	12000

**Table 10. Message Sizes (After Ref. 18)**

Each node in the network will initiate a message every ten seconds. The message types will vary according to the frequency in Table 9. The decision to use ten seconds significantly increases the amount of traffic flowing across the network and ensures a sufficient message load is achieved.

#### **D. INFORMATION REQUIREMENTS FOR A SEPARATE CID NETWORK**

The information requirements for combat identification within a Marine Air-Ground Task Force (MAGTF) must maximize combat effectiveness and minimize the risk of fratricide. [Ref. 2] The units of a MAGTF can be grouped into three general categories comprised of air, vehicle, and ground. Within the model it is assumed that each EUT will be generating a CID message. An encoded CID message is assumed to be 500 bits. [Ref. 23]

Since there is a wide disparity in the speed of each type of unit, it was assumed that faster moving units would need their position updated more frequently. A standard report interval was determined based on the units' maximum velocity and the maximum desired distance traveled between updates. The numbers selected for these categories were generalized to provide a basic understanding of the units involved. The report interval was determined by dividing the maximum distance between reports by the maximum velocity for each unit type. [Ref. 23] Table 11 shows the report intervals determined for each unit type.

UNIT TYPE	MAX VELOCITY	MAX DISTANCE BETWEEN REPORTS	REPORT INTERVAL
Aircraft	500 m/s	1,000 m	2 sec
Vehicles	30 m/s	500 m	15 sec
Ground Troops	5 m/s	100 m	20 sec

**Table 11. Report Interval Determination (From Ref. 23)**

All CID message traffic will be sent to a central repository to ensure a common tactical picture amongst all units. To ensure survivability there must be an additional repository. This second repository will be co-located with the main and will be updated periodically. A more distributed approach to data collection would increase survivability, however; the ability to maintain a common tactical picture and increase situational awareness amongst all units would become more difficult with this approach. Additionally, it is not likely that this strategy would reduce message traffic on the network.

The central location chosen was the MEB Headquarters. This location was selected based on the assumption that the Command Element would be more integral and influential during combat operations. The central repository must also be capable of distributing CID message traffic to every unit within the network. The CID node is assumed to have some intelligence to identify the necessary recipients of CID message traffic. This assumption reduces redundant and unnecessary CID message traffic across the network. During combat, the flow of CID information from the central node to specific EUTs and aircraft would be determined by the overall situation and by specific mission requirements. For example, during a close air support mission in the vicinity of ground troops, the central node would send CID messages to the close air support aircraft and the ground troops in the nearby vicinity at update rates equal to the reporting rates identified in Table 11. In order to simplify the determination of routing requirements for the dissemination of CID messages in the network model, it is assumed that the central node will distribute CID messages to all EUTs at all times, however, the report interval will be at a reduced rate. Table 12 identifies the report interval for CID messages from the central location.

UNIT TYPE	REPORT INTERVAL
Aircraft	8 sec
Vehicles	60 sec
Ground Troops	80 sec

**Table 12. Report Interval of CID Messages**

The interval selected ensures a sufficient amount of CID message traffic flowing across the network to facilitate an effective evaluation of the impact of CID information requirements. Additionally, this methodology will ensure that when there are potential command and control gaps between units operating in the vicinity of each other, there will be sufficient CID information to increase situational awareness and prevent incidents of fratricide.

THIS PAGE INTENTIONALLY LEFT BLANK



## V. NETWORK CHARACTERISTICS AND SIMULATION RESULTS

### A. OPERATING CHARACTERISTICS

A network of this magnitude must be capable of supporting various levels of quality of service. The different types of message traffic will be assigned priorities. This will allow the network to differentiate traffic and allow higher priority messages to proceed to the front of the line. Higher priority messages will then have an increased quality of service. Table 13 identifies the priorities implemented in the model.

MSG TYPE	PRIORITY
CID	1
Video	2
Voice	3
Network Traffic	4

**Table 13. Message Priority**

The goal of the network should be to provide the commander as much bandwidth as possible and allow him to adjust the quality of service based on the situation. Although the assignment of priorities may not be the most efficient or accurate method, it is the only feasible solution that can be modeled.

The overhead message traffic to maintain this diverse topology is not included in the model. The information on this issue is scarce and difficult to quantify. The dynamic nature of this network and the mobility requirements necessary to support a military force make this even more challenging. The overall impact of this limitation is minimal and will not significantly impact the decision between a dedicated CID network and a full-

functioning network. It is important to note that if two distinct networks were developed, this topology overhead would exist twice.

Multicast is a restricted form of broadcasting that can improve bandwidth efficiency. Multicast allows a set of computers to be assigned one address. A copy of any message sent to the address is delivered to each of the computers in the set. The ability of this network to support multicast is important and must be explored. The abundance of message traffic across this network makes multicast a very appealing technology. Unfortunately, there are still many unresolved issues that will hinder the implementation of a multicast strategy and it would be difficult to model with Extend. This is a critical area that needs to be explored in future research.

## **B. SCALING THE MODEL**

The wireless communications architecture is scalable to a size comparable to that of a Marine Expeditionary Brigade; however, there are still many employment considerations associated with this technology that need to be answered. [Ref. 20] The equipment and network utilized during the ELB demonstration are not designed to replace existing tactical radios and command nets, but rather to complement them. This may result in some economies as various applications transition to the ELB infrastructure. Nevertheless, the logistics burden will be increased as these items are fielded. Sufficient measures must also be taken to ensure the end user terminals are properly integrated with the combat load. Additionally, the durability of the equipment needs to be enhanced to ensure it is capable of operating under extreme conditions.

The ultimate goal is to provide a force the necessary technology to execute OMFTS and STOM. The number of EUTs for each unit and the configuration of the network architecture are based on current doctrine and potential use. These numbers are likely to change as the system evolves and development continues; however, the scenario chosen is sufficient to answer some very important questions about the scalability of the network and its potential to handle different types of information.

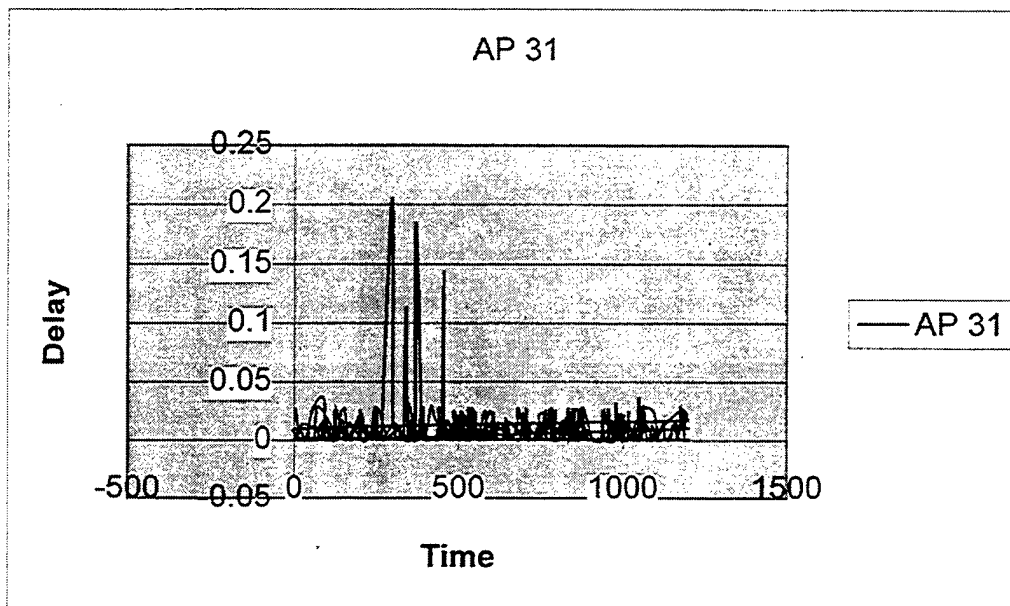
The final model consists of forty-eight access points and two hundred and nine EUTs. The model is approximately one hundred and sixty-five megabytes. The model rapidly grew in size as the architecture to support a MEB sized force was instituted. As the model grew, it became increasingly difficult to work with and required multiple adjustments. A machine with at least two hundred and fifty six megabytes of RAM is needed to run a simulation. The difficulties associated with the simulations are a result of software and hardware limitations.

### **C. SIMULATION RESULTS**

A multitude of simulation runs were conducted. Each run is described in detail in the following sections. The basic parameters were a full-scale network that did not include any CID information, a full-scale network with CID, and then just CID. All the runs were programmed for 1200 simulation seconds. All EUTs were initially configured to simulate an architecture that would use a 2MB PCMCIA card, thereby limiting the throughput to 2 MB. The data is summarized in the following sections.

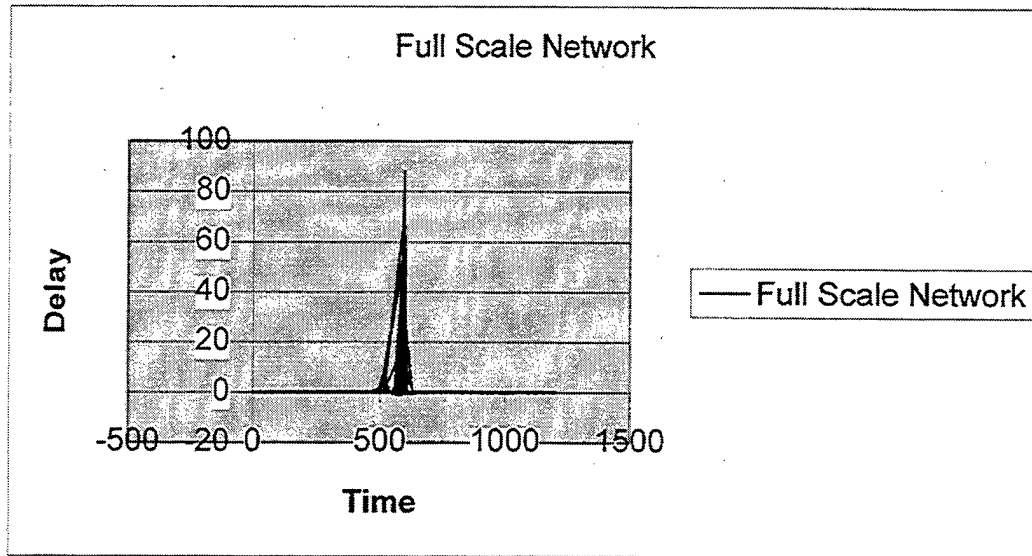
## 1. Full-Scale Network

This simulation consisted of a full-scale network and did not include any CID information. During this simulation, two separate VTC communications were conducted. The first VTC was initiated at 200 seconds and the second at 500 seconds. An increase in the delay can readily be seen at the approximate times that the VTC was initiated. The first VTC was initiated at AP 5, a Regimental Headquarters, and addressed to AP 31, an Infantry Battalion Headquarters. Figure 19 is demonstrative of this increase and the impact on a specific AP. The delay rapidly increases at the start of the VTC and then begins to stabilize.



**Figure 19. Run 1, AP 31 Test Results**

Figure 20 consolidates all the test data from the different EUTs and once again the increase in delay during the VTC is apparent. The second VTC was initiated at 500



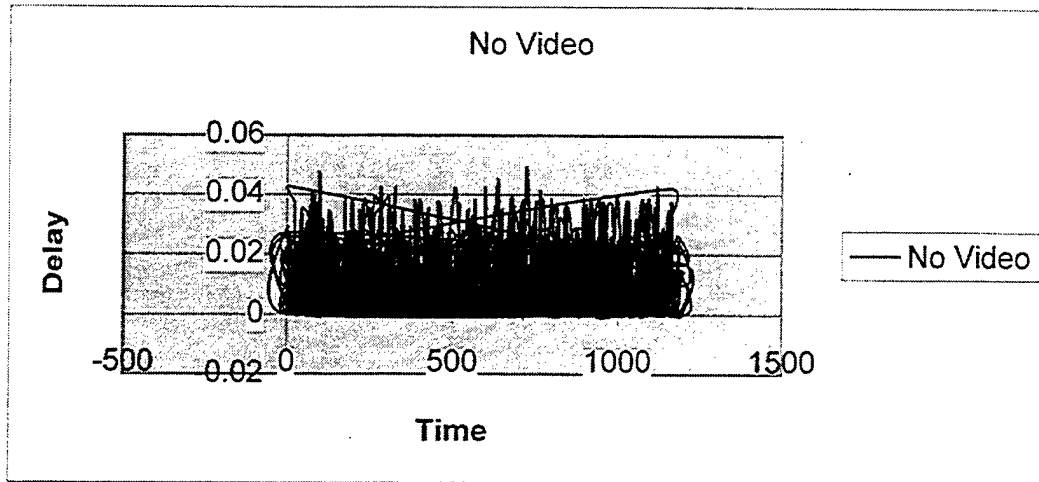
**Figure 20. Run 1 Test Data**

seconds and the delay dramatically increases. This second VTC was initiated at AP 1, COC, and addressed to AP 5. Although the first VTC increased the delay to a specific AP, its overall impact was less significant than the second VTC. This is a result of the second VTC being routed through the airborne relay, which is a significant choke point. Other than these instances, the delays were nominal. Table 14 identifies some basic information relative to the delays experienced. Appendix I includes all the report data.

<b>AVERAGE</b>	0.417795
<b>Max</b>	86.396
<b>Median</b>	0.012023
<b>St Dev</b>	4.429975
<b>Min</b>	5E-06

**Table 14. Run 1 Report Data**

Since VTC is having a significant impact on the delays experienced in the network, the simulation was conducted again without it. All other parameters remained the same. Figure 21 and Table 15 are provided. The delays are dramatically decreased.



**Figure 21. Run 1/No VTC Test Data**

<b>AVERAGE</b>	0.01211915
<b>Max</b>	0.049158724
<b>Median</b>	0.011763609
<b>St Dev</b>	0.010970641
<b>Min</b>	7.63636E-06

**Table 15. Run 1/No VTC Test Data**

## 2. Full-Scale Network and CID

In this simulation, CID information was added to the full-scale network. All the parameters associated with the full-scale network remained the same. The impact of VTC is also readily apparent during this simulation, however, there is also an increase in the overall delay. The average delay increased 49% from .417795 to .621604. Figure 22 and Table 16 are provided. Appendix J includes all the report data.

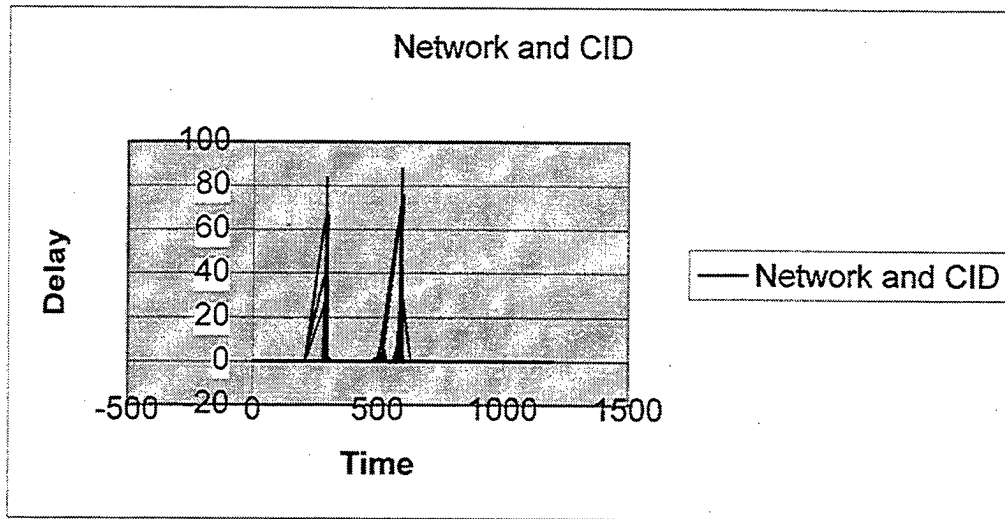
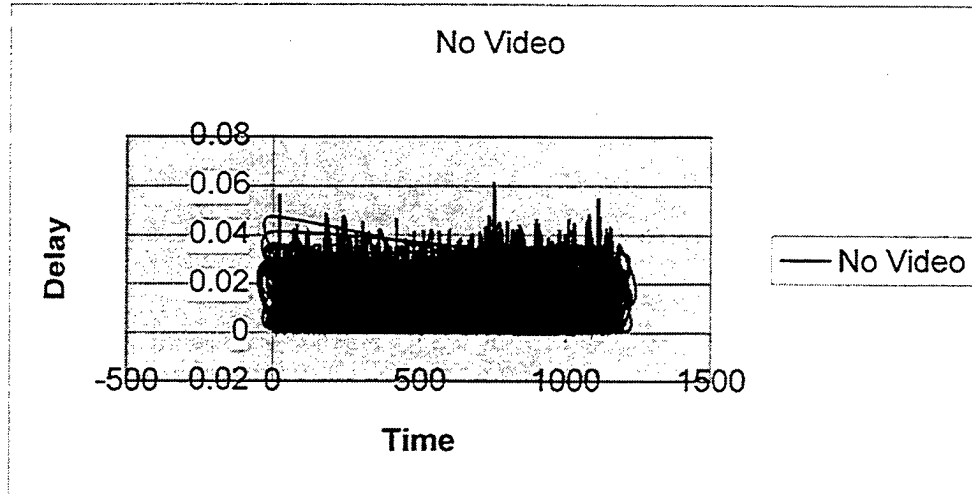


Figure 22. Run 2 Test Data

<b>AVERAGE</b>	0.621604
<b>Max</b>	86.38352
<b>Median</b>	0.013536
<b>St Dev</b>	5.722291
<b>Min</b>	0.000042

Table 16. Run 2 Test Data

In an effort to limit the impact of VTC on the results, this simulation was also conducted without VTC. Figure 23 and Table 17 are provided.



**Figure 23. Run 2/No VTC Test Data**

<b>AVERAGE</b>	0.013172
<b>Median</b>	0.012903
<b>Max</b>	0.061106
<b>Min</b>	0.000042
<b>St Dev</b>	0.011761

**Table 17. Run 2/No VTC Test Data**

Under these conditions (without VTC), the average delay is .013172 as compared to .621604 when VTC was included. When VTC was included, CID increased delays by 49%. When VTC was not included, CID increased delays by 9%. In each instance, CID had a significant impact on the performance of the network.

Since CID messages are time-critical and the network was developed to give CID messages a higher priority, it is important to differentiate between message types. Additionally, the delays associated specifically with CID can be used to determine if the



CID update rate is adequate. Figure 24 and Table 18 are provided to capture the delays specific to CID messages on a full-scale network that included VTC.

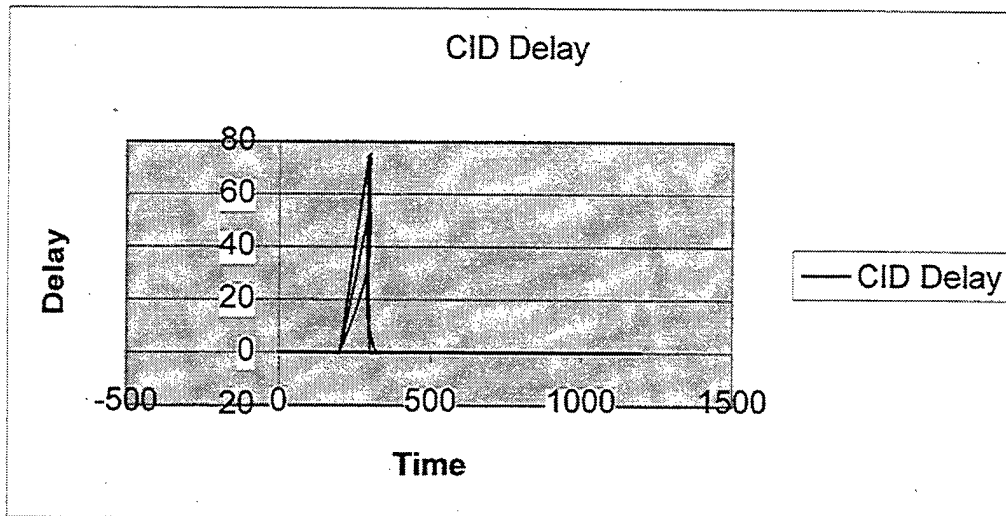
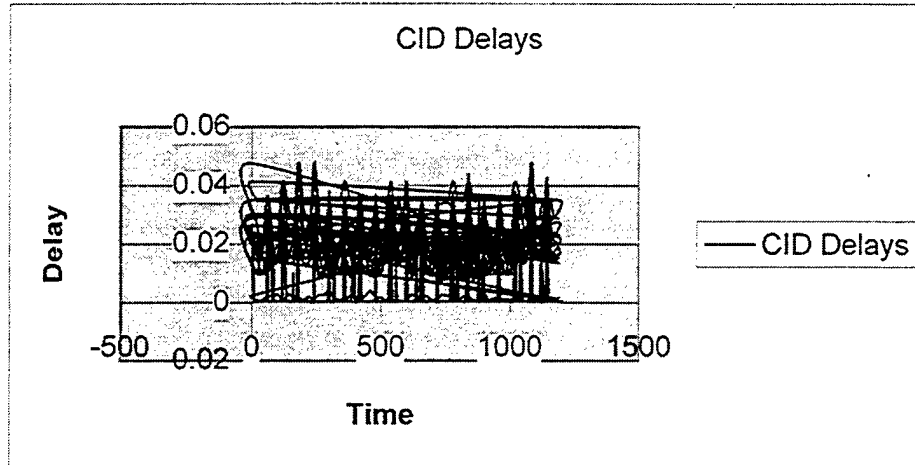


Figure 24. Run 2/VTC/CID Delays

<b>AVERAGE</b>	0.575401
<b>Max</b>	83.51808
<b>Median</b>	0.012341
<b>St Dev</b>	5.470853
<b>Min</b>	0.000042

Table 18. Run 2/VTC/CID Delays

Figure 25 and Table 19 are provided to capture the delays specific to CID messages on a full-scale network that did not include VTC.



**Figure 25. Run 2/No VTC/CID Delays**

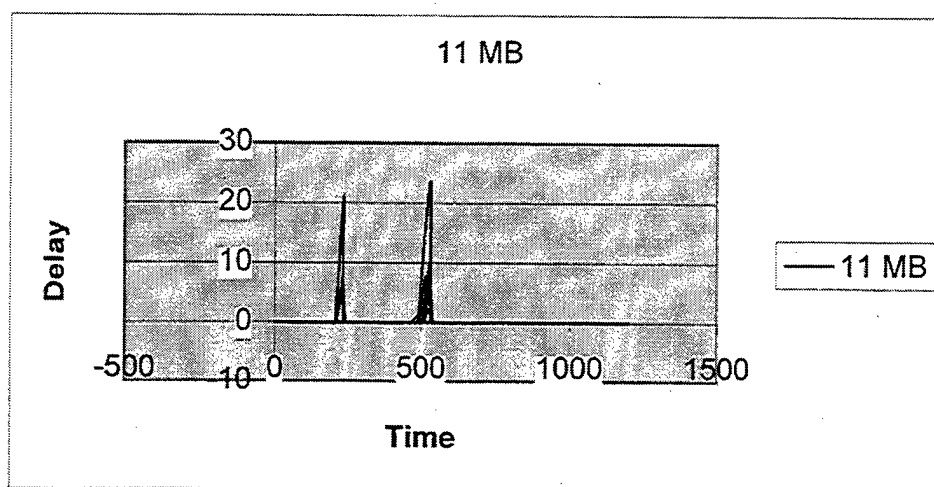
<b>AVERAGE</b>	0.012603
<b>Max</b>	0.061106
<b>Min</b>	0.000042
<b>Median</b>	0.011798
<b>St Dev</b>	0.011771

**Table 19. Run 2/No VTC/CID Delays**

This data will be used to evaluate whether or not a full-scale network can support CID information requirements. In the first instance (with VTC), the average CID delay is 7% lower than the average delay for the entire network. In the second instance (without VTC), the average CID delay is 4% lower than the average delay for the entire network. Even though CID has a higher priority, there is not a dramatic improvement in its performance on the network.

A complete evaluation, however, cannot be completed in a vacuum and must take into account expected technological advances. Technology is rapidly increasing and according to Moore's Law, the computational power available at a particular price

doubles every 18 months. [Ref. 22] This is an extremely powerful phenomenon and must be considered. Lucent is already developing an 11 MB PCMCIA card that will increase throughput to 11 MB. Since it is important to identify the potential impact of this increase, a simulation was conducted using the 11 MB PCMCIA card. Figure 26 and Table 20 are provided.



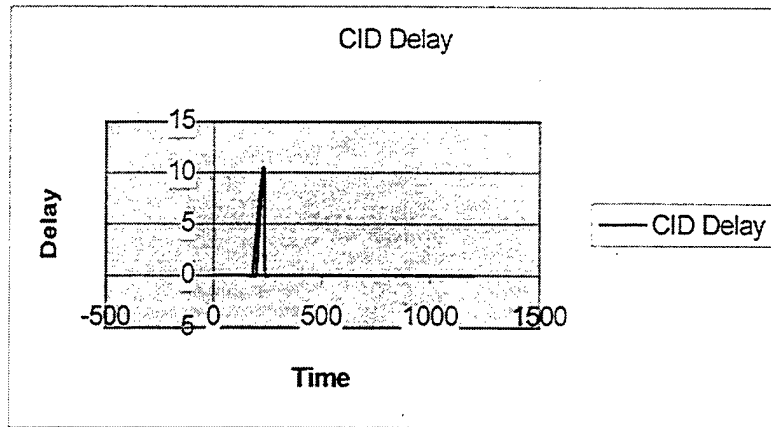
**Figure 26. Run 2/11 MB Test Data**

<b>AVERAGE</b>	0.041082893
<b>Median</b>	0.011265636
<b>Min</b>	7.63636E-06
<b>Max</b>	23.539735
<b>St Dev</b>	0.60231048

**Table 20. Run 2/11 MB Test Data**

It is clear that the overall delay was much less than the architecture that simulated a 2 MB throughput and this is consistent with communications theory. Although VTC is still having an impact, the delay is much smaller and further to the left on the time scale. The message is spending less time within the destination EUT and an acknowledgment is

initiated much sooner. At this throughput level, the delays associated with CID specific messages are identified in Figure 27 and Table 21. Once again, the delays are significantly lower than the 2 MB throughput.



**Figure 27. Run 2/11 MB/CID Delay**

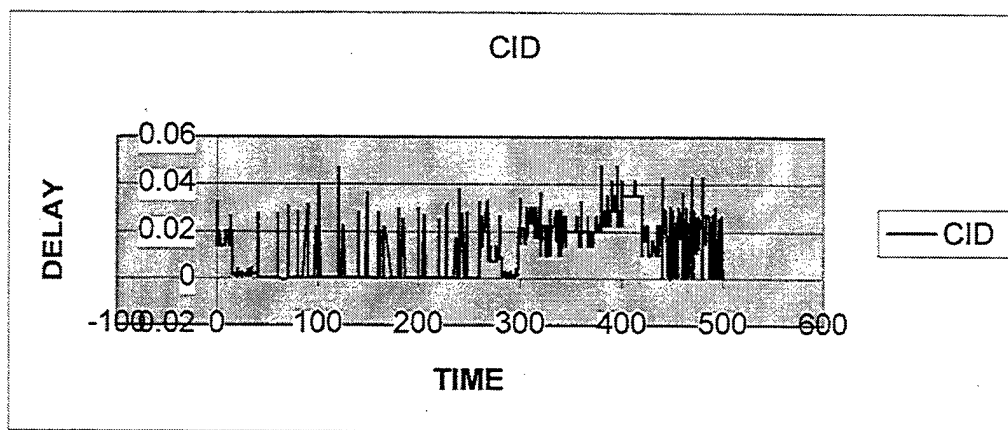
<b>AVERAGE</b>	0.034595827
<b>Median</b>	0.010563428
<b>Min</b>	7.63636E-06
<b>Max</b>	20.797291
<b>St Dev</b>	0.514154398

**Table 21. Run 2/11 MB/CID Delay**

The impact of technology is dramatic and cannot be discounted. Although it is difficult to predict future technological advances, it is clear that technology will continue to increase and improve the performance of the network. The potential of technology must be considered in any solution.

### 3. Stand-Alone CID

This simulation included only CID information. After 500 seconds of simulation time, the delays had stabilized and remained within a specific range. The data generated during this time period is sufficient to identify the delays associated with a stand-alone CID network. Figure 28 depicts this and aggregates all the delays experienced across the network.



**Figure 28. Run 3 Test Data**

Although the quantity of CID messages generated is high, the relative small size of each message (500 bits) results in a significantly lower delay. This is to be expected in the absence of VTC, Voice, and other high bandwidth demanding messages. Table 22 identifies some basic information relative to the delays experienced. Appendix K includes all the report data.

<b>AVERAGE</b>	0.012351263
<b>Max</b>	0.047544
<b>Median</b>	0.010084
<b>St Dev</b>	0.012061183
<b>Min</b>	8.97467E-05

**Table 22. Run 3 Test Data**

These delays are much smaller than those experienced when CID information was included on the full-scale network. However, there is not a significant difference between the average delay on the stand-alone CID network (.012351) and the delay of the full-scale network that included CID, but did not include VTC (.013172). This distinction is blurred even further as technological advances are considered.

The results of the simulations will be very valuable in making a conclusion between a dedicated CID information network and a full-scale network capable of handling CID information. Table 23 is provided to summarize the key points. The average delay will be used for all comparisons.

	Average Delay	CID Specific Delay	CID Impact	VTC Impact	Technology Impact
Full-scale network/VTC	.417795	NA		97% increase in delay	NA
Full-scale network/ No VTC	.01211915				
Full-scale network/CID/ VTC	.621604	.575401 *7% lower than avg delay	49% increase in delay	97% increase in delay	NA
Full-scale network/CID/ No VTC	.013172	.012603 *4% lower than avg delay	9% increase in delay		
11 MB PCMCIA card/ VTC/CID	.04108	.03459	NA		93% decrease in both overall delay and specific CID delay
Stand-alone CID	.012351	NA	NA		

**Table 23. Summary of Simulation Results**

THIS PAGE INTENTIONALLY LEFT BLANK



## **IV. CONCLUSIONS AND RECOMMENDATIONS**

### **A. CONCLUSIONS**

The results of the simulations are complete and an abundance of data has been collected. It is now time to begin the process of recommending a solution between a dedicated CID situational awareness network versus including CID information on a full-functioning network. This decision will be based on the delays observed during the simulations.

Before any decision is made, it is important to understand the available solutions. The ultimate goal is to provide the commander with one network. Although this is an admirable objective, it should not be done without regard for performance. The time critical nature of CID information and the essential requirement to provide adequate situational awareness, necessitate a reduced latency. If this latency cannot be met with one network, then a separate CID situational awareness network must be developed. This solution has many deficiencies and pitfalls, but the ultimate goal is to ensure the information is properly propagated through a network to preclude any incidents of fratricide.

When two distinct networks are developed there is waste and inefficiency. The potential for a stovepipe system to emerge that cannot communicate with other networks is great and steps should be taken to preclude this from happening. Another consideration is limited resources. In today's environment of reduced budgets and the

prevailing attitude of do more with less, it will be difficult to find the resources for two separate networks. It is also important to note that bandwidth is limited; so when a network is segregated, there is less bandwidth available and performance is likely to decrease.

Again, the decision will be based on the delays observed during the simulations. An acceptable delay is based on the report interval of CID. The report interval of CID was identified previously in Table 11 and was incorporated into the model. A standard report interval was determined based on the units' maximum velocity and the maximum desired distance traveled between updates. The numbers selected for these categories were generalized to provide a basic understanding of the units involved. The report interval was determined by dividing the maximum distance between reports by the maximum velocity for each unit type. Table 24 is provided to display this information again.

UNIT TYPE	MAX VELOCITY	MAX DISTANCE BETWEEN REPORTS	REPORT INTERVAL
Aircraft	500 m/s	1,000 m	2 sec
Vehicles	30 m/s	500 m	15 sec
Ground Troops	5 m/s	100 m	20 sec

**Table 24. CID Report Interval**

A latency of approximately 20% of the report interval is deemed to be acceptable. The acceptable delay rate is provided in Table 25.

UNIT TYPE	ACCEPTABLE DELAY RATE
Aircraft	.4 sec
Vehicles	3 sec
Ground Troops	4 sec

**Table 25. Acceptable Delay Rate**

By comparing the acceptable delay to the average delays identified in the simulation results, the following conclusions can be made. The average CID specific delay on the full-scale network that included CID and VTC was .575401. Although this is slightly above the acceptable delay rate for aircraft (.575401 compared to .4), it is well below in regards to vehicles and ground troops. Additionally, if you take into account the 11 MB PCMCIA card, the delay is significantly below the acceptable delay rate. Based on these figures alone and the compounding effect of technology, the full functioning network can support CID.

The only reason the delay is so high, is due to the substantial increase in delay observed during the VTC. During the VTC, delays for all message types increase dramatically. This serves to significantly increase the average delay. This is demonstrated in the dramatic reduction of delays when VTC is not included. The debilitating impact of VTC is clear from the data generated and it is not exclusive to a network that incorporates CID. In both cases, VTC dramatically increased delays. These increase in delays were experienced during the VTC transmission and then subsided.

This is not unusual and is common to any high bandwidth demanding application. It does point out, however, the necessity of the commander to properly manage and implement these types of applications only at certain times in context of the battlefield situation. When this is effectively done, the delays will be well below the acceptable rate.

If CID information were on a stand-alone network, this requirement to implement controls would not exist. Nevertheless, the commander is still going to have to make those same decisions for the full functioning network. Therefore, the perceived benefit of a stand-alone CID network is diminished.

Although the impact of CID increases the overall delay (49% with VTC and 9% without VTC), when you look specifically at the CID delay within the full functioning network it is close to the delay observed in the stand-alone CID network. The full-scale network that included CID and no VTC had a delay of .012603 and the stand-alone CID delay was .012351. Based on these results, the stand-alone CID network does not significantly increase performance.

## **B. RECOMMENDATIONS**

One network is capable of handling all requirements to include CID, but to be effective certain controls must be put in place to ensure high bandwidth demanding applications are not initiated during critical combat situations. By moving to a stand-alone CID network this requirement is eliminated, however, overhead is increased and the ability to acquire the necessary resources to support two separate networks will be challenging. The ultimate goal is to provide the commander with one network and as

much bandwidth as possible to meet all his requirements. Based on the results of the simulations conducted, a full functioning network is capable of supporting CID information requirements. This ability will only be enhanced as technology increases. It is recommended to pursue the development of one full functioning network.

### **C. FUTURE AREAS OF RESEARCH**

The model developed is an accurate representation of a wireless network that could be fielded to a Marine Expeditionary Brigade operating under the principles of OMFTS. Although there are limitations that need to be addressed, this model is capable of providing insight into the delays that would be inherent to a large-scale network.

Extend is a powerful modeling and simulation tool, however, there were some difficulties encountered that limited the effectiveness of the model. To model a network of this size and magnitude that incorporated the diverse information requirements associated with both a full-scale network and CID is extremely difficult. Even though there are limitations in the model, the data generated is capable of providing insight into determining the most effective solution between a dedicated CID situational awareness network versus including CID information on a full functioning network.

As with any model, it is important to continue the development process in an iterative manner as the understanding of the actual system increases. There are several concepts that should be explored in the future to enhance the performance of this model. Although quality of service was addressed through the assignment of priorities, a more dynamic and efficient procedure could possibly improve overall performance.

Furthermore, the ability to quantify overhead message traffic and incorporate it into the model would increase the accuracy of the results. Additionally, the ability of this network to support multicast is important and must be explored. The abundance of message traffic across this network makes multicast a very appealing technology. Security issues and data compression techniques were also outside the scope of this thesis.

There are still many employment considerations associated with this technology that need to be answered. Many assumptions were made in regard to the number of EUT's and the specific message load associated with the network. Additional studies are also necessary to more accurately identify CID information requirements. The equipment and network utilized are not designed to replace existing tactical radios and command nets, but rather to complement them. As the development of this innovative technology continues, these issues are likely to be resolved and can then be incorporated into the model.

Dynamic roaming AP's were not addressed. The assumption in the model is that the AP is relatively fixed and that the EUT's are free to roam about. This is similar to the commercial office environment where computers may be moved to new locations, but the AP's are fixed within the office space. Roaming AP's create addressing problems that are still being studied within the private and DoD sectors.

These issues ultimately need to be addressed and resolved to effectively implement this new technology. Nevertheless, the model developed is a valuable tool to

aid in this endeavor. The results obtained are realistic, insightful, and likely to stimulate new ideas.

THIS PAGE INTENTIONALLY LEFT BLANK

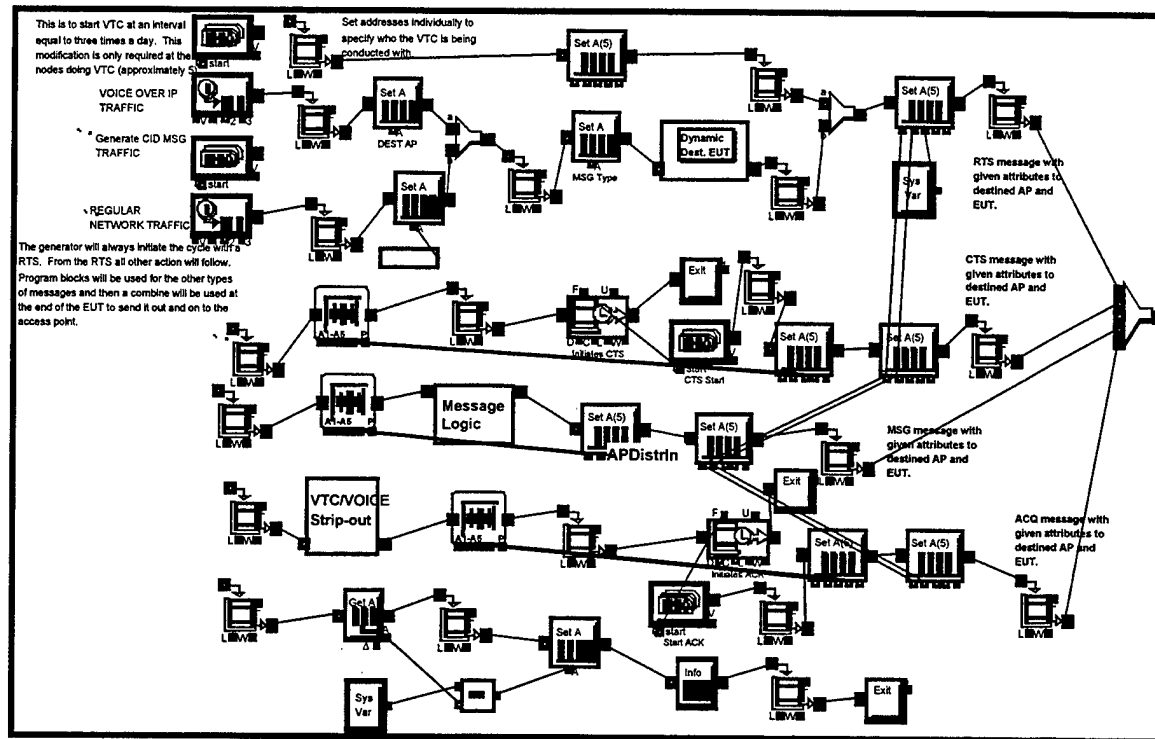


## APPENDIX A. DATA DICTIONARY

TERM	DESCRIPTION
EUT	End User Terminal
AP	Access Point
MSG SIZE	Message Size
RTS	Ready to Send Message...initiated by EUT
CTS	Clear to Send Message...initiated by receipt of RTS
MSG	Actual Message...initiated by receipt of CTS
ACK	Acknowledgement...initiated by receipt of MSG
MSG TYPE	1 = RTS 2 = CTS 3 = MSG 4 = ACK
DESTINATION AP	First part of address notation/used to determine if a message is internal or external to an AP (1,2,3 - X)
DESTINATION EUT	Second part of address notation/used to make final routing decision within an AP for internal messages. Dependent on the intended recipient of the message (1,2,3 - X)
ORIGIN AP	Dependent on the AP from which an EUT initiated a message (1,2,3 - X)
ORIGIN EUT	Dependent on the EUT that initiated a message (1,2,3 - X)
COMM TYPE	1 = Video 2 = Voice 3 = CID 4 = Est or Confirm Contact 5 = SITREP 6 = SPOTREP 7 = Request Information 8 = Issue Orders

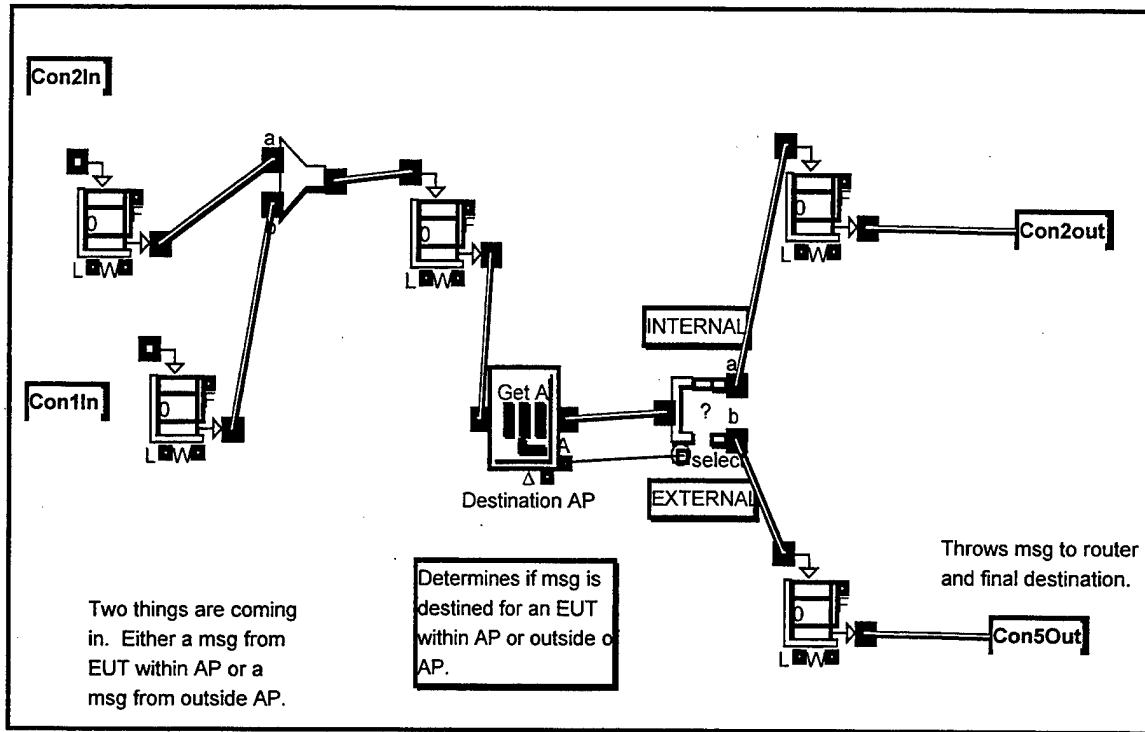
THIS PAGE INTENTIONALLY LEFT BLANK

## APPENDIX B. END USER TERMINAL LOGIC



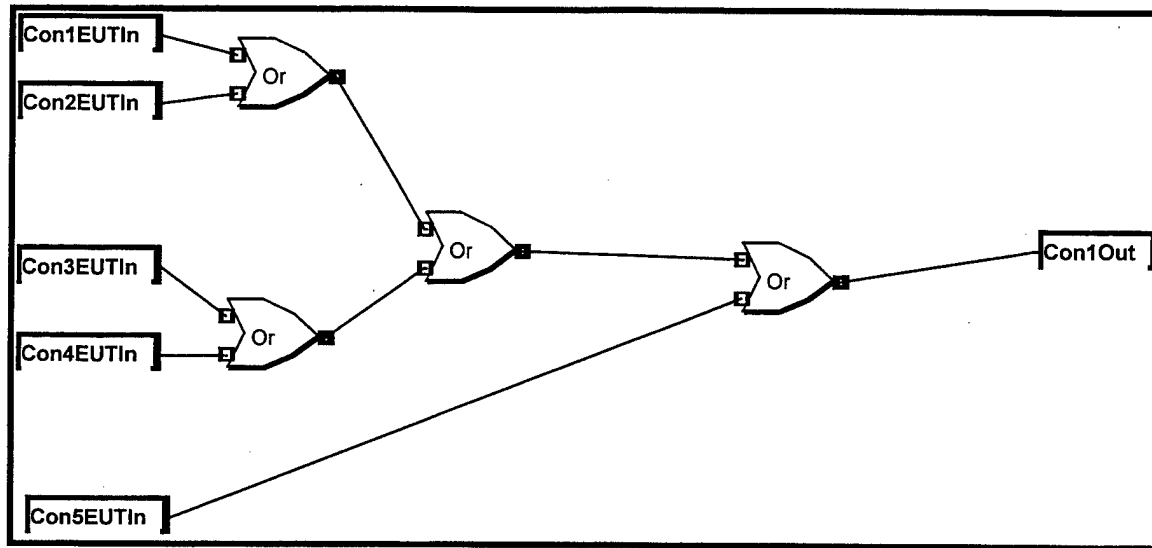
THIS PAGE INTENTIONALLY LEFT BLANK

## APPENDIX C. INTERNAL/EXTERNAL LOGIC



THIS PAGE INTENTIONALLY LEFT BLANK

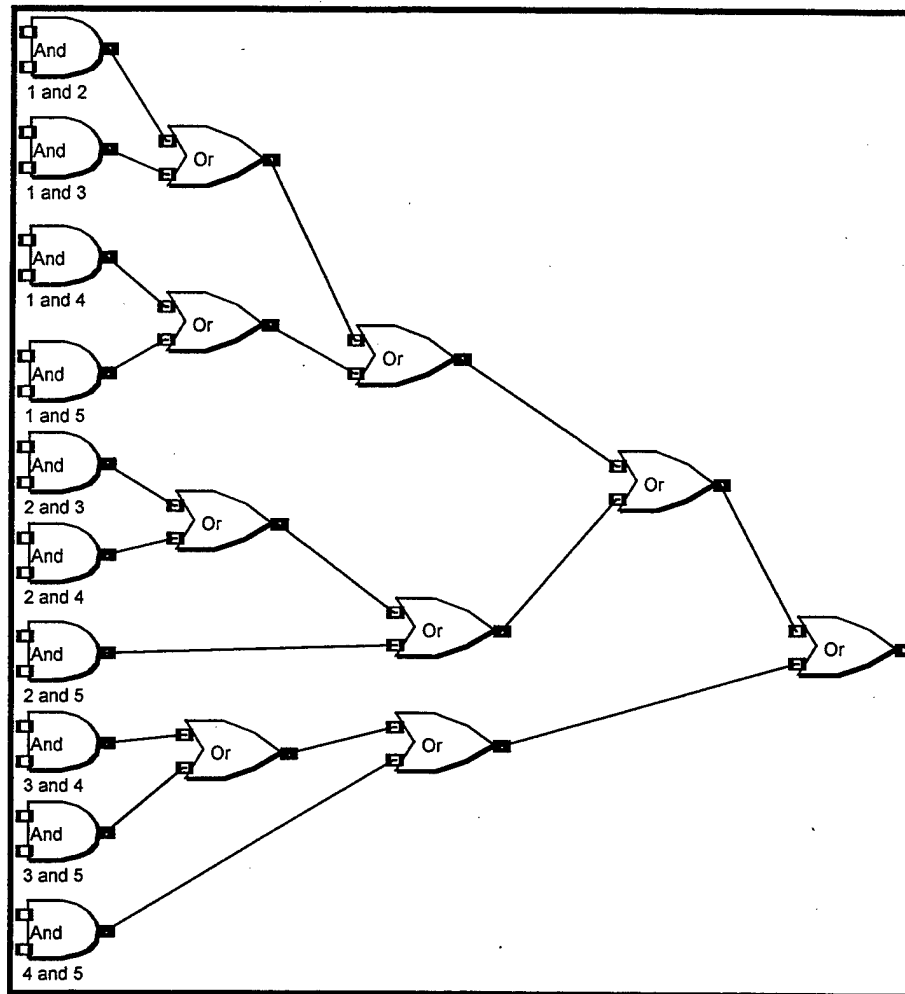
## APPENDIX D. SENSOR LOGIC



THIS PAGE INTENTIONALLY LEFT BLANK



## APPENDIX E. DETECTOR LOGIC



THIS PAGE INTENTIONALLY LEFT BLANK

## APPENDIX F. ELB ROUTING TABLE

*Note: The attribute value of the DESTINATION ACCESS POINT is used to make all routing decisions*

### MESSAGES LEAVING ACCESS POINT # 1

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1	INTERNAL
2	VRC-99 # 1
3	VRC-99 # 1
4	VRC-99 # 1
5	VRC-99 # 1
6	VRC-99 # 1
7	VRC-99 # 1

### MESSAGES LEAVING ACCESS POINT # 2

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1	VRC-99 # 1
2	INTERNAL
3	3
4	VRC-99 # 3
5	VRC-99 # 3
6	VRC-99 # 2
7	VRC-99 # 2

### MESSAGES LEAVING ACCESS POINT # 3

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1	VRC-99 # 1
2	2
3	INTERNAL
4	VRC-99 # 3
5	VRC-99 # 3
6	VRC-99 # 2
7	VRC-99 # 2

**MESSAGES LEAVING ACCESS POINT # 4**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1	VRC-99 # 3
2	VRC-99 # 3
3	VRC-99 # 3
4	INTERNAL
5	5
6	VRC-99 # 3
7	VRC-99 # 3

**MESSAGES LEAVING ACCESS POINT # 5**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1	4
2	4
3	4
4	4
5	INTERNAL
6	4
7	4

**MESSAGES LEAVING ACCESS POINT # 6**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1	VRC-99 # 2
2	VRC-99 # 2
3	VRC-99 # 2
4	VRC-99 # 2
5	VRC-99 # 2
6	INTERNAL
7	7

**MESSAGES LEAVING ACCESS POINT # 7**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1	6
2	6
3	6
4	6
5	6

6	6
7	INTERNAL

### MESSAGES LEAVING VRC-99 # 1

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1	1
2	2
3	3
4	VRC-99 # 3
5	VRC-99 # 3
6	VRC-99 # 2
7	VRC-99 # 2

### Messages Leaving VRC-99 # 2

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1	VRC-99 # 1
2	2
3	3
4	VRC-99 # 3
5	VRC-99 # 3
6	6
7	6

### MESSAGES LEAVING VRC-99 # 3

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1	VRC-99 # 1
2	2
3	3
4	4
5	4
6	VRC-99 # 2
7	VRC-99 # 2

THIS PAGE INTENTIONALLY LEFT BLANK

## APPENDIX G. FINAL ROUTING TABLE

*Note: The attribute value of the DESTINATION ACCESS POINT is used to make all routing decisions*

### MESSAGES LEAVING ACCESS POINT # 1

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1	INTERNAL
2-48	VRC 1

### MESSAGES LEAVING ACCESS POINT # 2

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1	VRC 1
2	INTERNAL
3	3
4-15	VRC 2
16-17	VRC 4
18-48	VRC 2

### MESSAGES LEAVING ACCESS POINT # 3

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1	VRC 1
2	AP2
3	INTERNAL
4-15	VRC 2
16-17	VRC 4
18-48	VRC 2

### MESSAGES LEAVING ACCESS POINT # 4

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-3	VRC 2
4	INTERNAL
5	AP5
6-11	VRC 15
11	VRC 15
12	AP12
13	AP13
14-15	VRC 3
16-17	VRC 2
18-21	VRC 5
22-30	VRC 6
31-39	VRC 9
40-48	VRC 12

**MESSAGES LEAVING ACCESS POINT # 5**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-3	VRC 2
4	AP4
5	INTERNAL
6-11	VRC 15
12	AP12
13	AP13
14-15	VRC 3
16-17	VRC 2
18-21	VRC 5
22-30	VRC 6
31-39	VRC 9
40-48	VRC 12

**MESSAGES LEAVING ACCESS POINT # 6**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-5	VRC 15
6	INTERNAL
7	AP7
8	AP8
9	AP9
10	AP10
11	AP11
12-48	VRC 15

**MESSAGES LEAVING ACCESS POINT # 7**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-5	VRC 15
6	AP6
7	INTERNAL
8	AP8
9	AP9
10	AP10
11	AP11
12-48	VRC 15

**MESSAGES LEAVING ACCESS POINT # 8**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1	VRC 15
6	AP6
7	AP7
8	INTERNAL
9	AP9



10	AP10
11	AP11
12-48	VRC 15

**MESSAGES LEAVING ACCESS POINT # 9**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-5	VRC 15
6	AP6
7	AP7
8	AP8
9	INTERNAL
10	AP10
11	AP11
12-48	VRC 15

**MESSAGES LEAVING ACCESS POINT # 10**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-5	VRC 15
6	AP6
7	AP7
8	AP8
9	AP9
10	INTERNAL
11	AP11
12-48	VRC 15

**MESSAGES LEAVING ACCESS POINT # 11**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-5	VRC 15
6	AP6
7	AP7
8	AP8
9	AP9
10	AP10
11	INTERNAL
12-48	VRC 15

**MESSAGES LEAVING ACCESS POINT # 12**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-3	VRC 2
4	AP4
5	AP5
6-11	VRC 15

12	INTERNAL
13	API3
14-15	VRC 3
16-17	VRC 2
18-21	VRC 5
22-30	VRC 6
31-39	VRC 9
40-48	VRC 12

#### **MESSAGES LEAVING ACCESS POINT # 13**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-3	VRC 2
4	AP4
5	AP5
6-11	VRC 15
12	API2
13	INTERNAL
14-15	VRC 3
16	VRC 2
17	VRC 2
18-21	VRC 5
22-30	VRC 6
31-39	VRC 9
40-48	VRC 12

#### **MESSAGES LEAVING ACCESS POINT # 14**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-13	VRC 3
14	INTERNAL
15	API5
16-48	VRC 3

#### **MESSAGES LEAVING ACCESS POINT # 15**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-14	14
15	INTERNAL
16-48	14

#### **MESSAGES LEAVING ACCESS POINT # 16**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-15	VRC 4
15	VRC 4
16	INTERNAL

17	AP17
18-48	VRC 4

**MESSAGES LEAVING ACCESS POINT # 17**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-16	AP16
17	INTERNAL
18-48	AP16

**MESSAGES LEAVING ACCESS POINT # 18**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-17	VRC 5
18	INTERNAL
19	AP19
20	AP20
21	AP21
22-48	VRC 5

**MESSAGES LEAVING ACCESS POINT # 19**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-17	VRC 5
18	AP18
19	INTERNAL
20	AP20
21	AP21
22-48	VRC 5

**MESSAGES LEAVING ACCESS POINT # 20**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-17	VRC 5
18	AP18
19	AP19
20	INTERNAL
21	AP21
22-48	VRC 5

**MESSAGES LEAVING ACCESS POINT # 21**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-17	VRC 5
18	AP18
19	AP19
20	AP20
21	INTERNAL
22-48	VRC 5

**MESSAGES LEAVING ACCESS POINT # 22**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-21	VRC 6
22	INTERNAL
23	VRC 7
24	VRC 8
25	AP25
26	AP26
27	AP27
28	AP28
29	AP29
30	AP30
31-48	VRC 6

**MESSAGES LEAVING ACCESS POINT # 23**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-22	VRC 7
23	INTERNAL
24-48	VRC 7

**MESSAGES LEAVING ACCESS POINT # 24**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-23	VRC 8
24	INTERNAL
25-48	VRC 8

**MESSAGES LEAVING ACCESS POINT # 25**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-21	VRC 6
22	AP22
23	VRC 7

24	VRC 8
25	INTERNAL
26	AP26
27	AP27
28	AP28
29	AP29
30	AP30
31-48	VRC 6

#### MESSAGES LEAVING ACCESS POINT # 26

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-21	VRC 6
22	AP22
23	VRC 7
24	VRC 8
25	AP25
26	INTERNAL
27	AP27
28	AP28
29	AP29
30	AP30
31-48	VRC 6

#### MESSAGES LEAVING ACCESS POINT # 27

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-21	VRC 6
22	AP22
23	VRC 7
24	VRC 8
25	AP25
26	AP26
27	INTERNAL
28	AP28
29	AP29
30	AP30
31-48	VRC 6

#### MESSAGES LEAVING ACCESS POINT # 28

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-21	VRC 6
22	AP22
23	VRC 7
24	VRC 8
25	AP25
26	AP26
27	AP27

28	INTERNAL
29	AP29
30	AP30
31-48	VRC 6

**MESSAGES LEAVING ACCESS POINT # 29**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-21	VRC 6
22	AP22
23	VRC 7
24	VRC 8
25	AP25
26	AP26
27	AP27
28	AP28
29	INTERNAL
30	AP30
31-48	VRC 6

**MESSAGES LEAVING ACCESS POINT # 30**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-21	VRC 6
22	AP22
23	VRC 7
24	VRC 8
25	AP25
26	AP26
27	AP27
28	AP28
29	AP29
30	INTERNAL
31-48	VRC 6

**MESSAGES LEAVING ACCESS POINT # 31**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-30	VRC 9
31	INTERNAL
32	VRC 10
33	VRC 11
34	AP34
35	AP35
36	AP36
37	AP37
38	AP38
39	AP39
40-48	VRC 9

**MESSAGES LEAVING ACCESS POINT # 32**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-31	VRC 10
32	INTERNAL
33-48	VRC 10

**MESSAGES LEAVING ACCESS POINT # 33**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-32	VRC 11
33	INTERNAL
34-48	VRC 11

**MESSAGES LEAVING ACCESS POINT # 34**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-30	VRC 9
31	AP31
32	VRC 10
33	VRC 11
34	INTERNAL
35	AP35
36	AP36
37	AP37
38	AP38
39	AP39
40-48	VRC 9

**MESSAGES LEAVING ACCESS POINT # 35**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-30	VRC 9
31	AP31
32	VRC 10
33	VRC 11
34	AP34
35	INTERNAL
36	AP36
37	AP37
38	AP38
39	AP39
40-48	VRC 9

**MESSAGES LEAVING ACCESS POINT # 36**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-30	VRC 9
31	AP31
32	VRC 10
33	VRC 11
34	AP34
35	AP35
36	INTERNAL
37	AP37
38	AP38
39	AP39
40-48	VRC 9

**MESSAGES LEAVING ACCESS POINT # 37**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-30	VRC 9
31	AP31
32	VRC 10
33	VRC 11
34	AP34
35	AP35
36	AP36
37	INTERNAL
38	AP38
39	AP39
40-48	VRC 9

**MESSAGES LEAVING ACCESS POINT # 38**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-30	VRC 9
31	AP31
32	VRC 10
33	VRC 11
34	AP34
35	AP35
36	AP36
37	AP37
38	INTERNAL
39	AP39
40-48	VRC 9



**MESSAGES LEAVING ACCESS POINT # 39**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-30	VRC 9
31	AP31
32	VRC 10
33	VRC 11
34	AP34
35	AP35
36	AP36
37	AP37
38	AP38
39	INTERNAL
40-48	VRC 9

**MESSAGES LEAVING ACCESS POINT # 40**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-39	VRC 12
40	INTERNAL
41	VRC 14
42	VRC 13
43	AP43
44	AP44
45	AP45
46	AP46
47	AP47
48	AP48

**MESSAGES LEAVING ACCESS POINT # 41**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-40	VRC 14
41	INTERNAL
42-48	VRC 14

**MESSAGES LEAVING ACCESS POINT # 42**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-41	VRC 13
42	INTERNAL
43-48	VRC 13

**MESSAGES LEAVING ACCESS POINT # 43**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-39	VRC 12
40	AP40
41	VRC 14
42	VRC 13
43	INTERNAL
44	AP44
45	AP45
46	AP46
47	AP47
48	AP48

**MESSAGES LEAVING ACCESS POINT # 44**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-39	VRC 12
40	AP40
41	VRC 14
42	VRC 13
43	AP43
44	INTERNAL
45	AP45
46	AP46
47	AP47
48	AP48

**MESSAGES LEAVING ACCESS POINT # 45**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-39	VRC 12
40	AP40
41	VRC 14
42	VRC 13
43	AP43
44	AP44
45	INTERNAL
46	AP46
47	AP47
48	AP48

**MESSAGES LEAVING ACCESS POINT # 46**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-39	VRC 12

40	AP40
41	VRC 14
42	VRC 13
43	AP43
44	AP44
45	AP45
46	INTERNAL
47	AP47
48	AP48

**MESSAGES LEAVING ACCESS POINT # 47**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-39	VRC 12
40	AP40
41	VRC 14
42	VRC 13
43	AP43
44	AP44
45	AP45
46	AP46
47	INTERNAL
48	AP48

**MESSAGES LEAVING ACCESS POINT # 48**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-39	VRC 12
40	AP40
41	VRC 14
42	VRC 13
43	AP43
44	AP44
45	AP45
46	AP46
47	AP47
48	INTERNAL

**MESSAGES LEAVING VRC-99 # 1**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1	AP1
2	AP2
3	AP3
4-15	VRC 2
16-17	VRC 4
18-48	VRC 2

### MESSAGES LEAVING VRC-99 # 2

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1	VRC 1
2	AP2
3	AP3
4	AP4
5	AP5
6-11	VRC 15
12	AP12
13	AP13
14-15	VRC 3
16-17	VRC 4
18-21	VRC 5
22	VRC 6
23-30	VRC 6
31-39	VRC 9
40-48	VRC 12

### MESSAGES LEAVING VRC-99 # 3

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-3	VRC 2
4	AP4
5	AP5
6-11	VRC 15
12	AP12
13	AP13
14	AP14
15	AP14
16-17	VRC 2
18-21	VRC 5
22-30	VRC 6
31-39	VRC 9
40-48	VRC 12

### Messages Leaving VRC-99 # 4

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1	VRC 1
2	AP2
3	AP3
4-15	VRC 2
16	AP16
17	AP16
18-48	VRC 2

**MESSAGES LEAVING VRC-99 # 5**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-3	VRC 2
4	AP4
5	AP5
6-11	VRC 15
12	AP12
13	AP13
14-15	VRC 3
16-17	VRC 2
18	AP18
19	AP19
20	AP20
21	AP21
22-30	VRC 6
31-39	VRC 9
40-48	VRC 12

**MESSAGES LEAVING VRC-99 # 6**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-3	VRC 2
4	AP4
5	AP5
6-11	VRC 15
12	AP12
13	AP13
14-15	VRC 3
16-17	VRC 2
18-21	VRC 5
22	AP22
23	VRC 7
24	VRC 8
25	AP25
26	AP26
27	AP27
28	AP28
29	AP29
30	AP30
31-39	VRC 9
40-48	VRC 12

**MESSAGES LEAVING VRC-99 # 7**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-21	VRC 6
22	AP22
23	AP23
24	VRC 8
25	AP25

26	AP26
27	AP27
28	AP28
29	AP29
30	AP30
31-48	VRC 6

**MESSAGES LEAVING VRC-99 # 8**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-21	VRC 6
22	AP22
23	VRC 7
24	AP24
25	AP25
26	AP26
27	AP27
28	AP28
29	AP29
30	AP30
31-48	VRC 6

**MESSAGES LEAVING VRC-99 # 9**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-3	VRC 2
4	AP4
5	AP5
6-11	VRC 15
12	AP12
13	AP13
14-15	VRC 3
16-17	VRC 2
18-21	VRC 5
22-30	VRC 6
31	31
32	VRC 10
33	VRC 11
34	AP34
35	AP35
36	AP36
37	AP37
38	AP38
39	AP39
40-48	VRC 12

**MESSAGES LEAVING VRC-99 # 10**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-30	VRC 9
31	AP31
32	AP32
33	VRC 11
34	AP34
35	AP35
36	AP36
37	AP37
38	AP38
39	AP39
40-48	VRC 9

**MESSAGES LEAVING VRC-99 # 11**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-30	VRC 9
31	AP31
32	VRC 10
33	AP33
34	AP34
35	AP35
36	AP36
37	AP37
38	AP38
39	AP39
40-48	VRC 9

**MESSAGES LEAVING VRC-99 # 12**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-3	VRC 2
4	AP4
5	AP5
6-11	VRC 15
12	AP12
13	AP13
14-15	VRC 3
16-17	VRC 2
18-21	VRC 5
22-30	VRC 6
31-39	VRC 9
40	40
41	VRC 14
42	VRC 13
43	AP43
44	AP44
45	AP45
46	AP46

47	AP47
48	AP48

**MESSAGES LEAVING VRC-99 # 13**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-39	VRC 12
40	AP40
41	VRC 14
42	AP42
43	AP43
44	AP44
45	AP45
46	AP46
47	AP47
48	AP48

**MESSAGES LEAVING VRC-99 # 14**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-39	VRC 12
40	AP40
41	AP41
42	VRC 13
43	AP43
44	AP44
45	AP45
46	AP46
47	AP47
48	AP48

**MESSAGES LEAVING VRC-99 # 15**

ATTRIBUTE VALUE (DESTINATION ACCESS POINT)	CATCH (NEXT ACCESS POINT IN ROUTE)
1-3	VRC 2
4	AP4
5	AP5
6	AP6
7	AP7
8	AP8
9	AP9
10	AP10
11	AP11
12	AP12
13	AP13
14-15	VRC 3
16-17	VRC 2
18-21	VRC 5
22-30	VRC 6



31-39	VRC 9
40-48	VRC 12

THIS PAGE INTENTIONALLY LEFT BLANK

## APPENDIX H. DISTRIBUTION FOR MESSAGE DESTINATIONS

### **AP 1**

AP 1	0.1
AP 4	0.4
AP 5	0.3
AP 16	0.1
AP 17	0.1

### **AP 2 & 3**

AIRBORNE RELAY - NO  
MESSAGE TRAFFIC  
GENERATED

### **AP 4**

AP 4	0.1
AP 5	0.3
AP 12	0.05
AP 13	0.05
AP 14	0.05
AP 16	0.05
AP 17	0.05
AP 18	0.05
AP 22	0.1
AP 31	0.1
AP 40	0.1

### **AP 5**

AP 4	0.3
AP 5	0.1
AP 12	0.05
AP 13	0.05
AP 14	0.05
AP 16	0.05
AP 17	0.05
AP 18	0.05
AP 22	0.1
AP 31	0.1
AP 40	0.1

### **AP 6**

AP 5	0.075
AP 6	0.1
AP 7	0.05
AP 8	0.05
AP 9	0.05
AP 10	0.05
AP 11	0.05
AP 12	0.075
AP 13	0.05
AP 18	0.1
AP 22	0.1
AP 31	0.1
AP 40	0.15

### **AP 7**

AP 5	0.075
AP 6	0.05
AP 7	0.1
AP 8	0.05
AP 9	0.05
AP 10	0.05
AP 11	0.05
AP 12	0.075
AP 13	0.05
AP 18	0.1
AP 22	0.1
AP 31	0.1
AP 40	0.15

### **AP 8**

AP 5	0.075
AP 6	0.05
AP 7	0.05
AP 8	0.1
AP 9	0.05
AP 10	0.05
AP 11	0.05
AP 12	0.075
AP 13	0.05
AP 18	0.1
AP 22	0.1
AP 31	0.1
AP 40	0.15

**AP 9**

AP 5	0.075
AP 6	0.05
AP 7	0.05
AP 8	0.05
AP 9	0.1
AP 10	0.05
AP 11	0.05
AP 12	0.075
AP 13	0.05
AP 18	0.1
AP 22	0.1
AP 31	0.1
AP 40	0.15

**AP 10**

AP 5	0.075
AP 6	0.05
AP 7	0.05
AP 8	0.05
AP 9	0.05
AP 10	0.1
AP 11	0.05
AP 12	0.075
AP 13	0.05
AP 18	0.1
AP 22	0.1
AP 31	0.1
AP 40	0.15

**AP 11**

AP 5	0.075
AP 6	0.05
AP 7	0.05
AP 8	0.05
AP 9	0.05
AP 10	0.05
AP 11	0.1
AP 12	0.075
AP 13	0.05
AP 18	0.1
AP 22	0.1
AP 31	0.1
AP 40	0.15

**AP 12**

AP 12	0.1
AP 13	0.05
AP 4	0.1
AP 5	0.1
AP 18	0.05
AP 22	0.2
AP 31	0.2
AP 40	0.2

**AP 13**

AP 12	0.05
AP 13	0.1
AP 4	0.1
AP 5	0.1
AP 18	0.05
AP 22	0.2
AP 31	0.2
AP 40	0.2

**AP 14**

AP 4	0.1
AP 5	0.1
AP 14	0.1
AP 15	0.2
AP 16	0.05
AP 17	0.05
AP 18	0.1
AP 22	0.1
AP 31	0.1
AP 40	0.1

**AP 15**

AP 4	0.1
AP 5	0.1
AP 14	0.2
AP 15	0.1
AP 16	0.05
AP 17	0.05
AP 18	0.1
AP 22	0.1
AP 31	0.1
AP 40	0.1

**AP 16**

AP 4	0.3
AP 5	0.3
AP 16	0.2
AP 17	0.2

**AP 17**

AP 4	0.3
AP 5	0.3
AP 16	0.2
AP 17	0.2

**AP 18**

AP 4	0.3
AP 5	0.3
AP 16	0.2
AP 17	0.2

**AP 19**

AP 18	0.05
AP 19	0.05
AP 20	0.1
AP 21	0.1
AP 22	0.1
AP 23	0.075
AP 24	0.075
AP 25	0.075
AP 26	0.075
AP 27	0.075
AP 28	0.075
AP 29	0.075
AP 30	0.075

**AP 20**

AP 18	0.05
AP 19	0.1
AP 20	0.05
AP 21	0.1
AP 31	0.1
AP 32	0.075
AP 33	0.075
AP 34	0.075
AP 35	0.075
AP 36	0.075
AP 37	0.075
AP 38	0.075
AP 39	0.075

**AP 21**

AP 18	0.05
AP 19	0.1
AP 20	0.1
AP 21	0.05
AP 40	0.1
AP 41	0.075
AP 42	0.075
AP 43	0.075
AP 44	0.075
AP 45	0.075
AP 46	0.075
AP 47	0.075
AP 48	0.075

**AP 22**

AP 4	0.05
AP 5	0.05
AP 18	0.05
AP 22	0.1
AP 23	0.0875
AP 24	0.0875
AP 25	0.0875
AP 26	0.0875
AP 27	0.0875
AP 28	0.0875
AP 29	0.0875
AP 30	0.0875
AP 31	0.05
AP 40	0.05

**AP 23**

AP 22	0.2
AP 23	0.1
AP 24	0.1
AP 25	0.1
AP 26	0.1
AP 27	0.1
AP 28	0.1
AP 29	0.1
AP 30	0.1

**AP 24**

AP 22	0.2
AP 23	0.1
AP 24	0.1
AP 25	0.1
AP 26	0.1
AP 27	0.1
AP 28	0.1
AP 29	0.1
AP 30	0.1

**AP 25**

AP 22	0.2
AP 23	0.1
AP 24	0.1
AP 25	0.1
AP 26	0.1
AP 27	0.1
AP 28	0.1
AP 29	0.1
AP 30	0.1

**AP 26**

AP 22	0.2
AP 23	0.1
AP 24	0.1
AP 25	0.1
AP 26	0.1
AP 27	0.1
AP 28	0.1
AP 29	0.1
AP 30	0.1

**AP 27**

AP 22	0.2
AP 23	0.1
AP 24	0.1
AP 25	0.1
AP 26	0.1
AP 27	0.1
AP 28	0.1
AP 29	0.1
AP 30	0.1

**AP 28**

AP 22	0.2
AP 23	0.1
AP 24	0.1
AP 25	0.1
AP 26	0.1
AP 27	0.1
AP 28	0.1
AP 29	0.1
AP 30	0.1

**AP 29**

AP 22	0.2
AP 23	0.1
AP 24	0.1
AP 25	0.1
AP 26	0.1
AP 27	0.1
AP 28	0.1
AP 29	0.1
AP 30	0.1

**AP 30**

AP 22	0.2
AP 23	0.1
AP 24	0.1
AP 25	0.1
AP 26	0.1
AP 27	0.1
AP 28	0.1
AP 29	0.1
AP 30	0.1

**AP 31**

AP 4	0.05
AP 5	0.05
AP 18	0.05
AP 22	0.05
AP 32	0.0875
AP 33	0.0875
AP 34	0.0875
AP 35	0.0875
AP 36	0.0875
AP 37	0.0875
AP 38	0.0875
AP 39	0.0875
AP 31	0.1
AP 40	0.05

**AP 32**

AP 31	0.2
AP 32	0.1
AP 33	0.1
AP 34	0.1
AP 35	0.1
AP 36	0.1
AP 37	0.1
AP 38	0.1
AP 39	0.1

**AP 33**

AP 31	0.2
AP 32	0.1
AP 33	0.1
AP 34	0.1
AP 35	0.1
AP 36	0.1
AP 37	0.1
AP 38	0.1
AP 39	0.1

**AP 34**

AP 31	0.2
AP 32	0.1
AP 33	0.1
AP 34	0.1
AP 35	0.1
AP 36	0.1
AP 37	0.1
AP 38	0.1
AP 39	0.1

**AP 35**

AP 31	0.2
AP 32	0.1
AP 33	0.1
AP 34	0.1
AP 35	0.1
AP 36	0.1
AP 37	0.1
AP 38	0.1
AP 39	0.1

**AP 36**

AP 31	0.2
AP 32	0.1
AP 33	0.1
AP 34	0.1
AP 35	0.1
AP 36	0.1
AP 37	0.1
AP 38	0.1
AP 39	0.1

**AP 37**

AP 31	0.2
AP 32	0.1
AP 33	0.1
AP 34	0.1
AP 35	0.1
AP 36	0.1
AP 37	0.1
AP 38	0.1
AP 39	0.1

**AP 38**

AP 31	0.2
AP 32	0.1
AP 33	0.1
AP 34	0.1
AP 35	0.1
AP 36	0.1
AP 37	0.1
AP 38	0.1
AP 39	0.1

**AP 39**

AP 31	0.2
AP 32	0.1
AP 33	0.1
AP 34	0.1
AP 35	0.1
AP 36	0.1
AP 37	0.1
AP 38	0.1
AP 39	0.1

**AP 40**

AP 4	0.05
AP 5	0.05
AP 18	0.05
AP 22	0.05
AP 41	0.0875
AP 42	0.0875
AP 43	0.0875
AP 44	0.0875
AP 45	0.0875
AP 46	0.0875
AP 47	0.0875
AP 48	0.0875
AP 31	0.05
AP 40	0.1

**AP 41**

AP 40	0.2
AP 41	0.1
AP 42	0.1
AP 43	0.1
AP 44	0.1
AP 45	0.1
AP 46	0.1
AP 47	0.1
AP 48	0.1

**AP 42**

AP 31	0.2
AP 32	0.1
AP 33	0.1
AP 34	0.1
AP 35	0.1
AP 36	0.1
AP 37	0.1
AP 38	0.1
AP 39	0.1

**AP 43**

AP 31	0.2
AP 32	0.1
AP 33	0.1
AP 34	0.1
AP 35	0.1
AP 36	0.1
AP 37	0.1
AP 38	0.1
AP 39	0.1

**AP 44**

AP 31	0.2
AP 32	0.1
AP 33	0.1
AP 34	0.1
AP 35	0.1
AP 36	0.1
AP 37	0.1
AP 38	0.1
AP 39	0.1

**AP 45**

AP 31	0.2
AP 32	0.1
AP 33	0.1
AP 34	0.1
AP 35	0.1
AP 36	0.1
AP 37	0.1
AP 38	0.1
AP 39	0.1

**AP 46**

AP 31	0.2
AP 32	0.1
AP 33	0.1
AP 34	0.1
AP 35	0.1
AP 36	0.1
AP 37	0.1
AP 38	0.1
AP 39	0.1

**AP 47**

AP 31	0.2
AP 32	0.1
AP 33	0.1
AP 34	0.1
AP 35	0.1
AP 36	0.1
AP 37	0.1
AP 38	0.1
AP 39	0.1

**AP 48**

AP 31	0.2
AP 32	0.1
AP 33	0.1
AP 34	0.1
AP 35	0.1
AP 36	0.1
AP 37	0.1
AP 38	0.1
AP 39	0.1



## APPENDIX I. RUN ONE TEST DATA

Each time point in the chart represents a message. This simulation included only the information associated with a full-scale network. CID was not included.

<u>TIME</u>	<u>DELAY</u>	<u>TIME</u>	<u>DELAY</u>	<u>TIME</u>	<u>DELAY</u>	<u>TIME</u>	<u>DELAY</u>
0.6499989	0.0002903	314.99002	0.0237078	672.55768	0.0010956	1026.8996	6.00E-05
0.860024	0.011723	314.99627	0.0299578	672.77745	0.0001221	1027.0365	0.0003579
1.090006	0.028435	314.99627	0.0299578	672.87168	0.0005673	1027.6688	0.0156726
1.4306126	0.0001558	316.39252	0.0207436	672.87218	0.0010652	1027.825	0.0098486
1.4882979	4.20E-05	316.99597	0.0012615	672.87249	0.0013745	1027.948	0.0001237
1.536274	0.0270725	317.55197	0.0003597	672.87256	0.0014436	1028.09	0.0234047
1.600024	0.0175415	317.56298	0.0003862	672.88628	0.0151658	1028.3213	0.0002732
1.792585	0.0003471	318.42229	0.0005969	672.89377	0.0226618	1028.5446	0.0037079
1.7938135	0.0015756	318.63665	0.0009142	672.89627	0.0251618	1028.7531	4.20E-05
1.7954278	0.0031899	318.91908	0.0003269	672.89877	0.0276618	1028.8938	0.0133798
1.801274	0.0090361	319.04377	0.0132463	673.08002	0.0127671	1029.4683	0.0009147
1.806274	0.0140361	319.2426	0.0011768	673.41791	0.0005168	1029.48	0.0126527
1.808774	0.0165361	319.25127	0.0098488	673.70502	0.0151959	1029.4813	0.0139027
1.813774	0.0215361	319.25627	0.0148488	674.01997	0.0009433	1029.4875	0.0201527
1.817528	0.0252901	319.26168	0.1250953	674.20489	0.0009241	1029.4913	0.0239027
1.9845537	0.0002677	319.26377	0.0223488	675.16454	0.0003523	1029.4938	0.0264027
2.093774	0.0218018	319.26627	0.0248488	675.16503	0.0008383	1029.4963	0.0289027
2.2774899	0.0014746	319.26752	0.0260988	675.16646	0.0022716	1029.4993	0.0007481
2.5190512	0.0018894	319.27127	0.0298488	675.18127	0.0170819	1029.5238	0.0564027
2.530024	0.0128622	319.28127	0.0398488	675.19002	0.0258319	1029.7671	0.0002639
2.531274	0.0141122	319.48877	0.0098223	675.19377	0.0295819	1030.0686	0.0002959
2.537524	0.0203622	320.77127	0.0148169	675.19877	0.0345819	1030.0695	0.0011736
2.537524	0.0203622	321.41636	0.0010961	675.19877	0.0345819	1030.0709	0.0025397
2.541274	0.0241122	321.42502	0.009756	675.34751	0.0136484	1030.08	0.0117031
2.546274	0.0291122	321.42627	0.011006	675.74201	0.0001583	1030.0813	0.0129491
2.546274	0.0254815	321.43752	0.022256	675.80002	0.0135134	1030.0875	0.0191991
2.553778	0.0366162	321.43877	0.023506	676.80502	0.0155926	1030.0963	0.0279491
2.6514073	0.0096406	321.44002	0.024756	677.1104	0.0013767	1030.0988	0.0304491
2.805186	0.0014395	321.44252	0.027256	677.55127	0.0144618	1030.2075	0.0318795
2.8477371	0.0001849	321.44877	0.033506	677.74413	0.000658	1030.515	0.0241717
2.990024	0.0256894	321.8127	0.0005785	677.89377	0.0113059	1030.6916	0.0001911
3.0107559	0.0003588	322.36752	0.0139279	678.33627	0.0135531	1030.8588	0.0204655
3.0113951	0.0009979	322.59502	0.0229448	678.70752	0.0244915	1032.5912	0.0005728
3.0119102	0.001513	322.64502	0.0111504	678.94877	0.0133019	1033.3937	0.0011425
3.0122688	0.0018716	322.74609	0.0004134	679.04627	0.0276836	1034.2211	0.0002924
3.020024	0.0096268	322.8039	0.0003607	679.23877	0.0096255	1034.45	0.0127455
3.021274	0.0108768	323.04251	0.0250878	679.53881	0.0008333	1034.9138	0.0252663
3.025024	0.0146268	323.75002	0.0143597	679.64253	0.011209	1035.18	0.0020417
3.036278	0.0258808	324.02015	0.0014028	679.64752	0.016201	1035.8419	0.002551

4.402524	0.0270757	324.62172	0.0072546	679.64752	0.016201	1035.8881	0.0006353
4.7380531	0.0004632	324.82751	0.0138772	679.64877	0.017451	1036.3438	0.0119937
5.537524	0.0116431	324.90627	0.0132331	679.65627	0.024951	1037.0896	0.0004555
6.250024	0.0119092	325.17252	0.0115187	679.65627	0.024951	1037.3563	0.0149757
6.798774	0.0128695	325.17252	0.0115187	679.67127	0.039951	1037.5188	0.0091669
6.8413402	0.0004261	325.17377	0.0127687	679.67127	0.039951	1037.8596	0.0006665
6.875024	0.0094141	325.17379	0.0127847	679.67752	0.0222795	1037.9275	0.0013911
6.9216035	0.0012467	325.18127	0.0202687	679.82319	0.0001737	1038.0278	0.0076803
7.3188382	0.0012411	325.20252	0.0415187	679.87127	0.0151511	1038.7724	0.0007113
7.326274	0.0086769	325.20877	0.0477687	680.21669	0.0010906	1038.8302	0.0015784
7.331274	0.0136769	325.33127	0.1702687	681.25721	0.0006718	1039.7556	0.0005526
7.337524	0.0199269	325.41877	0.014308	681.36252	0.0147213	1039.9272	0.0006811
7.338774	0.0211769	325.52752	0.0010495	681.98752	0.0140535	1040.2179	0.0003654
7.342524	0.0249269	325.95163	0.0001162	682.18627	0.0277899	1040.6838	0.0239132
7.346274	0.0286769	325.95179	0.0002792	682.40627	0.0161735	1040.73	0.0243688
7.362532	0.0449349	325.95269	0.001179	682.44627	0.0184299	1041.3813	0.0095993
8.2856309	0.0002972	325.96877	0.0172606	683.08731	0.0003202	1041.9619	0.0003353
8.4262692	0.0013457	325.97502	0.0235106	683.08741	0.0004139	1042.1586	0.0003286
8.437524	0.0126004	325.97752	0.0260106	683.08743	0.0004339	1042.4032	0.000329
8.438774	0.0138504	325.98627	0.0347606	683.08745	0.0004523	1042.4183	0.0001567
8.443774	0.0188504	325.98627	0.0347606	683.0876	0.0006084	1042.5589	0.0011224
8.445024	0.0201004	326.05289	0.0001977	683.08777	0.0007811	1043.26	0.0020206
8.448774	0.0238504	326.053	0.000308	683.10627	0.0192812	1043.4325	0.0250217
8.452524	0.0276004	326.05302	0.000327	683.11002	0.0230312	1043.6813	0.0128498
8.461278	0.0363544	326.05316	0.0004752	683.11128	0.0242852	1044	0.0107959
8.6639172	0.0004309	326.05331	0.0006247	683.34162	0.0017855	1044.8063	0.0220975
8.675024	0.0115377	326.07502	0.0223342	683.34877	0.008944	1045.1985	0.0006067
8.676274	0.0127877	326.07877	0.0260842	683.34967	0.0003202	1045.5125	0.0246051
8.682524	0.0190377	326.08003	0.0273382	683.35502	0.015194	1045.7093	0.000723
8.687524	0.0240377	326.89351	0.0002875	683.35502	0.015194	1048.4763	0.036129
8.690024	0.0265377	326.89493	0.0005593	683.36252	0.022694	1049.283	0.0004194
8.698778	0.0352917	327.66502	0.010423	683.36502	0.025194	1049.5731	0.0001155
8.705024	0.0415377	327.7593	0.0003117	683.36502	0.025194	1050.3254	0.0009293
8.8784811	0.0011374	328.29253	0.0109987	683.36502	0.025194	1050.4278	0.0010701
8.878522	0.0011783	328.29752	0.0159907	683.53025	0.0070688	1050.428	0.0012556
8.880546	0.0032023	328.29877	0.0172407	683.58475	0.0004716	1050.4281	0.0013303
8.890024	0.0126803	328.30377	0.0222407	683.61252	0.0159866	1050.4287	0.001964
8.893774	0.0164303	328.31252	0.0309907	684.40496	0.0003242	1050.4488	0.0220042
8.900024	0.0226803	328.32127	0.0397407	684.6137	0.0010479	1050.4525	0.0257502
8.901274	0.0239303	328.32127	0.0397407	684.81627	0.0260952	1050.455	0.0282502
8.905028	0.0276843	328.33127	0.0497407	685.13716	0.007346	1050.4563	0.0295002
9.1405801	0.0008871	329.11355	0.0002753	686.15377	0.012302	1050.88	0.0004319
9.7242308	0.0006282	329.18377	0.0156997	686.15377	0.012302	1050.919	0.0003672
9.7248355	0.001233	329.51877	0.0125735	686.15503	0.013556	1051.2267	0.0010237
9.7249554	0.0013528	330.5603	0.0004145	686.16252	0.021052	1051.2932	0.0004553
9.7251843	0.0015817	330.63547	0.0004051	686.16252	0.021052	1051.9003	0.0003167
9.732524	0.0089214	332.59604	0.000653	686.17127	0.029802	1052.0876	0.0004509
9.732524	0.0089214	332.81487	0.0006575	686.17752	0.036052	1052.1227	0.0014423

9.737524	0.0139214	332.84994	0.0004359	686.17754	0.036064	1052.1938	0.0135946
9.748778	0.0251754	332.85877	0.0092649	686.26452	0.0003153	1052.4286	0.0007693
10.172047	0.0064067	332.85877	0.0092649	686.35017	0.0002687	1052.525	0.0126466
10.191575	0.0038508	332.86252	0.0130149	686.8287	0.0005261	1052.675	0.0136052
10.196274	0.0085497	332.87252	0.0230149	687.43629	0.0013887	1053.0025	0.000579
10.202524	0.0147997	332.87752	0.0280149	687.71704	0.000817	1053.0028	0.0008645
10.210024	0.0222997	332.88127	0.0317649	688.80192	0.0011898	1053.0029	0.0010328
10.211278	0.0235537	332.88752	0.0380149	689.42926	0.0014854	1053.0041	0.0022362
10.212524	0.0247997	334.23775	0.0010239	689.43752	0.0097534	1053.0175	0.0156391
10.212524	0.0247997	334.67906	0.0011328	689.45002	0.0222534	1053.025	0.0231351
10.227524	0.0397997	334.74762	0.0001623	689.45127	0.0235034	1053.0275	0.0256351
10.650024	0.0137343	334.79972	0.0006138	689.45252	0.0247534	1053.0363	0.0343851
10.731274	0.0238465	335.47764	0.000217	689.45502	0.0272534	1053.05	0.0094445
11.261274	0.0149894	336.20877	0.0157079	689.45752	0.0297534	1053.3875	0.0129921
11.465024	0.0150252	336.72002	0.0243006	689.46252	0.0347534	1053.7265	0.0001934
11.987577	0.0004394	337.2008	0.0010134	689.64916	0.0006518	1053.7338	0.0316646
12.648966	0.0002357	337.36252	0.0160516	712.73808	1.00E-04	1054.0275	0.0132799
12.708774	0.0293405	337.56418	0.0011714	712.73826	0.0002742	1054.6263	0.0195418
13.373575	0.0006281	337.89703	0.0003217	712.73931	0.0013258	1054.6703	0.0004287
13.455106	0.0003688	337.90815	0.0002184	712.75002	0.0120397	1055.0279	0.0012965
13.472303	0.002626	339.09377	0.0167886	712.75127	0.0132897	1055.3925	0.0002995
13.476218	0.0008735	339.49212	0.0004788	712.75252	0.0145397	1055.6375	0.0100991
13.58491	0.0003495	340.98502	0.01178	712.76753	0.0295437	1055.6958	0.0019169
14.60843	0.0016552	340.99252	0.01928	712.76877	0.0307897	1057.315	0.0282598
14.61448	0.0001219	340.99376	0.015113	712.82155	0.0011523	1058.665	0.0273498
16.293774	0.0150438	340.99377	0.02053	712.83002	0.0096282	1059.115	0.0192634
16.513583	0.0002116	340.99377	0.02053	712.83627	0.0158782	1059.4	0.0152523
16.650024	0.0122758	340.99752	0.02428	712.83627	0.0158782	1059.9225	0.027374
16.760431	0.0014905	341.01502	0.04178	712.84377	0.0233782	1059.9864	0.0005496
16.959669	0.0003781	341.01502	0.04178	712.84627	0.0258782	1060.22	0.0089745
17.007524	0.0231089	341.1723	4.20E-05	712.84627	0.0258782	1060.4438	0.0224991
17.686508	0.0004011	341.17279	0.0005396	712.86003	0.0396322	1060.7488	0.0149553
17.79623	0.006887	341.17406	0.0018015	713.33533	0.0010966	1061.06	0.0298511
17.863003	0.0012118	341.18377	0.0115195	713.37421	6.00E-05	1061.1625	0.0129814
18.562524	0.0108964	341.18752	0.0152695	714.06555	0.000427	1061.2525	0.0185971
19.562993	0.0004041	341.19377	0.0215195	714.52752	0.0192727	1061.875	0.0126172
20.088235	0.0017808	341.19878	0.0265235	714.75627	0.0095223	1061.9434	0.000298
20.993774	0.0087086	341.23352	0.0003614	715.18752	0.011767	1062.6575	0.0114445
21.925024	0.0097716	341.31902	0.1538457	715.2887	0.0069921	1062.6818	0.0003942
22.127303	0.0003967	341.32627	0.1540195	715.33957	0.0009482	1063.105	0.0109657
22.737524	0.0240303	341.42987	0.0013142	715.38541	0.0016855	1063.2153	0.0077319
22.741694	0.0051513	342.00802	0.0003387	715.39252	0.0087999	1063.5775	0.0090366
22.750024	0.0134816	342.29758	0.000545	715.40627	0.0225499	1063.6989	0.000276
22.751274	0.0147316	342.33377	0.1131055	715.40627	0.0225499	1063.7438	0.0126886
22.756274	0.0197316	342.37803	0.0001887	715.40627	0.0225499	1064.0107	0.0003368
22.757524	0.0209816	343.60366	6.00E-05	715.41002	0.0262999	1064.7875	0.017006
22.761274	0.0247316	343.60376	0.0001632	715.42127	0.0375499	1065.3966	0.0092357
22.773778	0.0372356	343.60465	0.0010558	715.42377	0.0400499	1066.9544	0.0007103

22.777524	0.0409816	343.61377	0.0101762	715.58377	0.0310704	1068.0688	0.0144715
23.035751	0.0004131	343.61377	0.0101762	715.86699	0.0008401	1069.0332	0.0017022
23.1816	0.0001802	343.61502	0.0114262	716.49002	0.0168269	1069.0438	0.0122761
23.30398	0.0001645	343.61877	0.0151762	716.50334	0.0002905	1069.045	0.0135261
23.317701	0.0015015	343.63003	0.0264302	716.63293	0.0020067	1069.0513	0.0197761
23.325024	0.0088242	343.96314	0.000383	716.64252	0.0115979	1069.0563	0.0247761
23.327524	0.0113242	345.09045	0.0005028	716.64377	0.0128479	1069.0588	0.0272761
23.340024	0.0238242	345.14502	0.0106951	716.65002	0.0190979	1069.0613	0.0297761
23.340024	0.0238242	345.15728	0.0001284	716.65002	0.0190979	1069.0688	0.0372761
23.341274	0.0250742	346.04512	0.0017116	716.65377	0.0228479	1069.39	0.0215189
23.356274	0.0400742	346.33252	0.0396612	716.65627	0.013828	1069.5617	0.0008182
23.362524	0.0463242	346.61877	0.0111854	716.65877	0.0278479	1069.8336	0.0050995
23.606274	0.012878	347.05002	0.01517	716.66628	0.0353519	1070.0063	0.0141257
23.763774	0.011722	347.32145	0.0008238	716.90752	0.0094309	1070.1708	0.0002123
24.414806	0.0003515	347.38508	0.0008224	717.39351	0.0005633	1070.2663	0.0100472
24.415109	0.0006547	347.39377	0.0095126	717.57753	8.19E-05	1070.2675	0.0112972
24.418466	0.0040119	347.39627	0.0120126	717.69331	0.0013553	1070.2675	0.0113132
24.424963	0.0105085	347.39627	0.0120126	717.83127	0.0205373	1070.2725	0.0162972
24.431274	0.0168195	347.40877	0.0245126	718.01252	0.0141888	1070.275	0.0187972
24.432524	0.0180695	347.41002	0.0257626	718.34729	0.0002438	1070.275	0.0187972
24.432524	0.0180695	347.41877	0.0345126	718.77752	0.0115092	1070.29	0.0337972
24.442528	0.0280735	347.41877	0.0345126	719.41377	0.0182661	1070.2963	0.0400472
25.210006	0.0407439	347.58903	0.0007585	719.46615	0.0003256	1070.85	0.018113
25.901765	0.0013103	348.31907	0.0018387	719.70279	0.0009484	1070.8503	0.0012266
26.304297	0.0007323	348.34475	0.0004333	719.70627	0.0140436	1070.9248	0.0002039
26.698774	0.016254	348.3457	0.0013756	719.94726	0.0007189	1071.8429	0.0003367
26.952524	0.0234604	348.35168	0.007355	720.07649	0.0004056	1072.3341	0.0013306
27.080375	0.000882	348.35627	0.0119525	720.29642	0.0004184	1072.3525	0.0197526
27.169063	0.0033177	348.36127	0.0169525	721.28127	0.0170145	1072.3525	0.0197526
27.405913	0.0003507	348.36752	0.0232025	721.41377	0.0135298	1072.3538	0.0210146
27.74949	0.0013308	348.36877	0.0244525	721.68079	0.0005449	1072.355	0.0222526
28.768774	0.0152275	348.37752	0.0332025	721.87252	0.0324357	1072.3563	0.0235026
29.193755	0.0002836	348.52332	0.0003541	721.88127	0.0118317	1072.3625	0.0297526
29.950024	0.020798	349.01784	0.0010584	723.17539	0.0010531	1072.3713	0.0385026
30.187477	0.0007658	349.08427	0.0010606	723.18377	0.0274185	1072.8845	6.00E-05
30.231256	0.0168485	349.29002	0.0234532	723.24986	0.0004473	1073.4238	0.0164341
30.447524	0.0156705	350.44502	0.0319759	723.42481	0.0012914	1074.2312	0.0003491
30.519022	0.0021523	350.67197	0.0008334	723.78627	0.0079251	1076.1075	0.0115292
30.530024	0.0131545	350.68027	0.0002052	723.79127	0.0129251	1076.375	0.0213535
30.530024	0.0131545	350.68047	0.0004106	723.79252	0.0141751	1077.63	0.0119359
30.537524	0.0206545	350.68061	0.0005513	723.79752	0.0191751	1078.0656	0.0010986
30.540024	0.0231545	350.68286	0.0027931	723.80002	0.0216751	1078.4625	0.0007203
30.542524	0.0256545	350.69253	0.0124649	723.80627	0.0279251	1078.7163	0.0149162
30.546274	0.0294045	350.70002	0.0199609	723.81502	0.0366751	1078.7163	0.0149162
30.546274	0.0294045	350.70502	0.0249609	723.83377	0.0554251	1078.7175	0.0161702
31.227923	0.0003076	350.70877	0.0287109	723.97384	0.0006222	1078.725	0.0236662
32.52596	0.0010919	350.99008	0.0003398	724.09377	0.0119148	1078.725	0.0236662
32.525999	0.0011306	351.92501	0.0126338	724.15055	0.0003787	1078.7275	0.0261662

32.526603	0.0017343	352.34921	0.001756	724.41964	0.0003846	1078.7275	0.0261662
32.537524	0.0126556	352.36127	0.0138166	724.47618	0.0061278	1078.74	0.0386662
32.542528	0.0176596	352.36127	0.0138166	724.86877	0.0138171	1079.9	0.0337559
32.543774	0.0189056	352.36127	0.0138166	725.03593	0.0003286	1080.3323	0.0017444
32.548774	0.0239056	352.36877	0.0213166	725.09251	0.0252492	1080.55	0.0013085
32.558774	0.0339056	352.37127	0.0238166	725.72001	0.0005588	1080.5907	0.000417
32.590605	5.00E-06	352.37127	0.0238166	726.10877	0.0215515	1080.6485	0.0006156
32.691248	0.0008606	352.37127	0.0238166	726.53002	0.0251568	1080.8775	0.0123108
32.839975	0.000309	352.78502	0.0279803	726.73752	0.0108628	1082.1277	0.0001668
33.009277	4.20E-05	353.61502	0.0225576	726.79111	0.0006132	1082.1613	0.0003288
33.371856	0.0003932	354.0386	0.0004218	726.83568	0.000641	1082.205	0.0003307
33.376843	0.0053806	354.22877	0.0109568	727.02502	0.0096576	1082.2175	0.0128367
33.379137	0.007675	354.23002	0.0122068	727.11766	0.0003668	1082.225	0.0203367
33.382524	0.0110616	354.23502	0.0172068	727.11774	0.0004445	1082.225	0.0203367
33.387524	0.0160616	354.23752	0.0197068	727.11796	0.0006618	1082.225	0.0203367
33.390024	0.0185616	354.23752	0.0197068	727.11839	0.0010976	1082.2288	0.0240867
33.393774	0.0223116	354.24877	0.0309568	727.11903	0.0017407	1082.2338	0.0290867
33.398778	0.0273156	354.25252	0.0347068	727.13752	0.0202307	1082.2413	0.0365907
33.520024	0.0099044	354.25877	0.0409568	727.14127	0.0239807	1083.9196	0.001015
33.734043	0.0004736	354.69114	0.0005076	727.14253	0.0252347	1083.93	0.0114043
33.791274	0.0237878	355.54808	0.0005534	727.29247	6.00E-05	1083.9313	0.0126543
33.868774	0.0095946	356.51736	9.21E-05	727.55675	0.0003511	1083.9375	0.0189043
34.605024	0.0240607	357.09377	0.0142463	728.89578	9.87E-05	1083.9375	0.0189043
34.763887	0.0014692	357.70341	0.0008086	729.20002	0.0124264	1083.9413	0.0226543
34.791961	0.0004481	358.55002	0.016511	729.70002	0.0150634	1083.9525	0.0339043
35.256274	0.0112396	358.95248	0.0002976	730.41704	0.0004104	1083.9538	0.0351583
35.690024	0.012496	359.95411	0.0008495	730.66502	0.0147134	1084.5254	0.0004451
36.631274	0.0136057	360.02877	0.0385474	731.44752	0.0263774	1084.878	0.0007852
36.699615	0.0101493	360.51799	0.000273	731.49585	0.0003404	1085.3508	0.0045919
36.906558	0.0022317	360.98218	0.0008035	731.94522	0.0002523	1085.6532	0.0013346
37.323915	0.0015526	361.11877	0.0157116	731.94585	0.0008789	1085.934	0.0055662
37.329718	0.0020088	361.351	0.000981	731.94688	0.0019063	1086.1688	0.0198407
39.48019	0.0002894	361.82066	0.000721	731.95627	0.0113014	1086.5313	0.0285214
39.83488	0.0020528	361.82664	0.0009151	731.95752	0.0125514	1086.6338	0.0261062
39.845024	0.0121964	361.84002	0.0143011	731.95877	0.0138014	1086.6524	0.0006506
39.856274	0.0234464	361.84002	0.0143011	731.96877	0.0238014	1086.8517	0.0002594
39.856274	0.0234464	361.84253	0.0168051	731.97378	0.0288054	1087.3449	0.0002313
39.857524	0.0246964	361.84752	0.0218011	732.2229	0.0011903	1087.3456	0.0009023
39.858774	0.0259464	361.85002	0.0243011	732.27502	0.0118841	1087.346	0.0013165
39.861274	0.0284464	361.85627	0.0305511	732.71171	0.0007969	1087.3465	0.0018498
39.868774	0.0359464	361.86502	0.0393011	732.72002	0.0091115	1087.3613	0.0165966
40.65407	0.0015384	362.02112	0.0003787	732.72502	0.0141115	1087.3688	0.0240926
40.662524	0.009992	362.88252	0.0088671	732.73252	0.0216115	1087.3713	0.0265926
40.676274	0.023742	362.98752	0.0116346	732.73627	0.0253615	1087.3738	0.0290926
40.677524	0.024992	363.15535	0.000839	732.74002	0.0291115	1087.4042	0.0019703
40.678774	0.026242	363.21001	0.0106902	732.74377	0.0328615	1087.7461	0.0003798
40.680024	0.027492	365.18752	0.0169176	732.75002	0.0391115	1087.9063	0.011715
40.682524	0.029992	365.3192	0.0017008	732.80013	0.0079216	1087.9555	0.0011124

40.687528	0.034996	365.42225	0.0012932	733.4329	0.0002355	1088.3688	0.0133319
41.318774	0.0114817	366.33633	0.0008081	733.49134	0.0001494	1088.5458	0.0005498
41.564404	0.0006361	366.337	0.001487	734.3673	0.0010687	1088.5563	0.0109862
41.81433	0.0002092	366.34627	0.0107565	735.32602	0.0003602	1088.5638	0.0184862
42.075024	0.0142434	366.34878	0.0132605	736.15502	0.0287339	1088.5688	0.0234862
42.191733	0.0003231	366.35252	0.0170065	736.63252	0.0095687	1088.57	0.0247362
42.284495	0.0018276	366.35627	0.0207565	736.84877	0.0134459	1088.5713	0.0259862
42.659865	0.0016287	366.35627	0.0207565	738.17501	0.0162135	1088.5738	0.0284862
42.686274	0.0104716	366.37752	0.0420065	738.81711	0.000401	1088.5813	0.0359862
42.890507	0.0004305	366.59593	0.0003066	738.81728	0.0005735	1089.1242	0.0003875
43.141437	0.0001509	367.30758	0.0007552	738.8183	0.0015857	1089.15	0.0164799
43.161083	0.0010666	367.34627	0.0244157	738.82627	0.0095638	1089.3524	0.0002439
44.037524	0.0112109	368.32002	0.0116092	738.82752	0.0108138	1089.3533	0.0011624
44.211274	0.0255851	368.9231	0.0004679	738.83127	0.0145638	1089.361	0.0088675
44.904527	0.0016665	369.61752	0.0006831	738.83752	0.0208138	1089.3638	0.0116591
44.912524	0.0096637	369.66997	0.0002531	738.84253	0.0258178	1089.365	0.0129091
44.913774	0.0109137	369.6899	0.0002691	739.47752	0.0116553	1089.3688	0.0166591
44.925024	0.0221637	369.85261	0.0005648	739.58458	0.0003397	1089.37	0.0179091
44.926274	0.0234137	369.94316	0.0012238	739.58539	0.0011446	1089.38	0.0279131
44.927524	0.0246637	369.98332	0.0003394	739.5855	0.0012535	1089.7867	0.0300431
44.930024	0.0271637	370.21722	0.0002538	739.58671	0.0024693	1089.8574	0.0019128
44.937524	0.0346637	370.22713	0.0010705	739.59878	0.0145343	1089.8638	0.0083027
45.092518	0.0003714	370.26877	0.1842479	739.60627	0.0220303	1089.8688	0.0133027
45.276274	0.012063	370.44685	0.0019217	739.61502	0.0307803	1089.875	0.0195527
46.436256	0.0296867	370.61252	0.0102386	739.61752	0.0332803	1089.8763	0.0208027
46.475024	0.0153197	370.87342	0.0004372	739.81252	0.0116545	1089.88	0.0245527
46.626512	0.0005013	371.20546	0.0048785	739.82502	0.0127046	1089.8838	0.0283027
47.250264	0.00049	371.58127	0.0199506	740.04613	0.0002277	1089.8925	0.0370527
47.453751	0.0005989	371.65502	0.0284169	740.04632	0.0004122	1089.9988	0.000189
47.468774	0.0136675	373.16789	0.0003342	740.04669	0.0007827	1090.66	0.0387108
47.666196	0.0013059	373.19877	0.0145725	740.04785	0.0019456	1090.8243	0.0016066
47.980506	0.01067	373.95627	0.0154652	740.06128	0.0153713	1090.8363	0.0136239
48.166692	4.20E-05	374.23127	0.0159898	740.06877	0.0228673	1090.8438	0.0211239
48.167173	0.0005232	375.04877	0.0115315	740.07127	0.0253673	1090.8438	0.0211239
48.16764	0.0009899	375.64083	0.0003984	740.07377	0.0278673	1090.8475	0.0248739
48.176274	0.0096244	375.64141	0.0009829	740.33757	6.00E-05	1090.85	0.0273739
48.177524	0.0108744	375.64191	0.0014782	740.83466	0.008921	1090.8525	0.0298739
48.181274	0.0146244	375.65252	0.012097	741.85002	0.0124086	1090.86	0.0373779
48.187524	0.0208744	375.65627	0.015847	741.98249	0.000637	1091.1713	0.0163642
48.192528	0.0258784	375.65752	0.017097	742.21501	0.0118481	1091.249	0.0024035
48.211879	0.0008282	375.66252	0.022097	742.46877	0.0107128	1091.2588	0.0122236
48.565024	0.0355892	375.66753	0.027101	743.22752	0.0230531	1091.2588	0.0122236
48.92163	0.000417	376.61459	0.0001002	743.84502	0.0214643	1091.2625	0.0159736
49.009698	0.0005073	377.71252	0.0138013	743.95377	0.0255061	1091.2713	0.0247236
49.018774	0.0095836	377.84107	0.0002244	744.38606	0.0002401	1091.2725	0.0259736
49.021274	0.0120836	377.86781	0.0003608	744.68975	0.0004398	1091.2813	0.0347236
49.021274	0.0120836	377.8895	0.0012363	744.78494	0.0006817	1091.2813	0.0347276
49.033774	0.0245836	377.9063	0.0004626	744.93759	0.00024	1091.3263	0.0127775

49.035024	0.0258336	378.11722	0.0001111	745.04745	0.0002946	1091.9913	0.0161326
49.043774	0.0345836	378.38343	0.0013031	745.04822	0.0010644	1092.5575	0.0003253
49.043774	0.0345836	378.59099	0.0003268	745.04835	0.0011939	1092.6175	0.0003834
50.162524	0.0111413	378.76	4.20E-05	745.0552	0.0080398	1092.6571	0.0014264
50.266121	0.0003422	380.80127	0.0242325	745.06752	0.0203675	1092.9938	0.0156867
50.453774	0.0092024	381.87244	0.0016779	745.06877	0.0216175	1093.0663	0.0245294
50.460024	0.0154524	381.89377	0.0106192	745.07127	0.0241175	1093.8038	0.0248633
50.468774	0.0242024	382.01572	0.0003522	745.08627	0.0391175	1094.985	0.0144009
50.468774	0.0242024	382.01594	0.0005711	745.63877	0.01052	1095.7088	0.0194216
50.471274	0.0267024	382.02627	0.0109021	745.82526	0.0012579	1095.9645	0.0002222
50.471274	0.0267024	382.02627	0.0109021	745.87502	0.0113669	1096.1772	0.0004518
50.480042	0.0354708	382.02752	0.0121521	746.07471	0.0004229	1096.9933	0.0009162
50.490024	0.0454524	382.03127	0.0159021	746.29903	0.0017253	1097.091	0.0006627
51.480484	0.0002735	382.04253	0.0271561	746.30516	0.0003409	1097.8025	0.010099
51.480684	0.0004735	382.26125	0.2458768	746.49367	0.0003347	1099.009	0.0061046
51.480698	0.0004882	382.61252	0.0207279	746.69002	0.0222997	1099.3111	0.0003221
51.481021	0.0008108	382.65002	0.0170422	746.91627	0.0089496	1099.8275	0.0228639
51.481137	0.0009266	382.69377	0.0160018	746.92252	0.0151996	1100.1002	0.0020154
51.500024	0.0198138	382.83059	0.0011963	746.93003	0.0227036	1100.1063	0.0081329
51.503774	0.0235638	383.05377	0.0264978	746.93127	0.0239496	1100.1138	0.0156329
51.505028	0.0248178	383.77627	0.0254752	746.93127	0.0239496	1100.12	0.0218829
51.581274	0.0127558	384.29311	0.0013937	746.93377	0.0264496	1100.1225	0.0243829
51.640373	0.0004128	384.75002	0.0091704	746.93377	0.0264496	1100.1238	0.0256329
51.87768	0.0003295	384.79201	0.0004173	746.94627	0.0389496	1100.1275	0.0293829
52.390024	0.0099447	384.98502	0.0121703	747.2873	0.0017468	1100.1375	0.0393829
52.801274	0.0235316	384.98502	0.0121703	747.29627	0.0107212	1100.216	0.0001483
53.308774	0.0266347	384.99253	0.0196743	747.29627	0.0107212	1100.365	0.0227197
53.362524	0.0150418	384.99377	0.0209203	747.29878	0.0132252	1100.8075	0.0252007
53.382899	0.0004407	384.99377	0.0209203	747.30627	0.0207212	1100.9206	0.0035235
54.483482	0.0002936	385.00252	0.0296703	747.30627	0.0207212	1101.0488	0.0150974
55.716274	0.0258832	385.00252	0.0296703	747.31002	0.0244712	1102.5225	0.010959
56.794043	0.0065484	385.00877	0.0359203	747.32752	0.0419712	1102.8318	0.000766
57.041749	0.0004789	385.81268	0.0004936	747.35329	0.0007957	1103.1396	0.0003022
57.186642	0.0010752	385.82127	0.0090827	747.37965	0.0070519	1103.1399	0.0005411
58.007524	0.0133499	385.82127	0.0090827	747.55353	0.0002662	1103.1403	0.0009987
58.427217	0.0008128	385.82502	0.0128327	747.58127	0.0108422	1103.1513	0.0119401
58.70946	6.00E-05	385.83502	0.0228327	747.66252	0.0119347	1103.1525	0.0131901
59.329137	0.0006428	385.84002	0.0278327	747.94335	0.0005205	1103.1563	0.0169401
59.656602	0.0008415	385.84377	0.0315827	747.95127	0.0084448	1103.1625	0.0231901
60.106274	0.0284358	385.85002	0.0378327	747.95627	0.0134448	1103.1675	0.0281941
60.191274	0.0313651	385.92502	0.0115164	747.96377	0.0209448	1103.7575	0.0121144
60.733774	0.0252574	386.02525	0.000969	747.96752	0.0246948	1106.6231	0.0004075
60.893774	0.0157659	386.03252	0.0082383	747.97502	0.0321948	1107.1192	0.0087391
61.682192	0.0003684	386.03752	0.0132383	747.97752	0.0346948	1108.2464	0.0002577
61.711274	0.0143577	386.04377	0.0194883	747.98003	0.0371988	1109.9513	0.0022806
61.852524	0.0190747	386.04502	0.0207383	749.21877	0.013313	1110.2483	0.0087632
61.990526	0.0003287	386.04877	0.0244883	749.34502	0.0211726	1110.3913	0.0120289
62.168774	0.012527	386.05877	0.0344883	750.04624	0.000216	1110.3975	0.0182789

62.243534	0.0004224	386.06252	0.0382383	750.65126	0.0015416	1110.3988	0.0195289
62.658774	0.0114235	386.08127	0.0123288	750.85002	0.0148372	1110.4	0.0207789
63.032524	0.0108575	386.2864	0.0004609	751.5998	0.006033	1110.4	0.0207829
63.368756	0.0124656	386.41252	0.0086976	751.60627	0.012506	1110.4088	0.0295289
63.424339	0.0079853	387.46002	0.0275717	751.60752	0.013756	1110.4088	0.0295289
63.430024	0.0136701	387.8666	0.000252	751.61377	0.020006	1110.415	0.0357789
63.437524	0.0211701	388.30627	0.0225115	751.61877	0.025006	1110.44	0.022305
63.437524	0.0211701	388.34824	0.0102971	751.62127	0.027506	1111.125	0.0109947
63.437524	0.0211701	388.34877	0.0108295	751.62377	0.030006	1111.285	0.0100741
63.441274	0.0249201	388.34877	0.0108295	751.63003	0.036264	1111.2925	0.0175781
63.446274	0.0299201	388.35502	0.0170795	751.74502	0.023886	1111.2938	0.0188241
63.453778	0.0374241	388.36252	0.0245795	751.9245	0.0004682	1111.3	0.0250741
63.482413	0.0018803	388.36502	0.0270795	752.03308	0.0002335	1111.3025	0.0275741
63.593774	0.0238267	388.36502	0.0270795	752.26002	0.012356	1111.3088	0.0338241
64.031925	9.82E-05	388.36502	0.0270795	752.26002	0.012356	1111.3088	0.0338241
64.168014	0.0003649	388.45087	0.0001192	752.26129	0.013622	1111.31	0.0350741
65.144551	0.0006603	389.04691	0.0003858	752.26877	0.021106	1111.563	0.0010962
65.144799	0.0009086	389.25877	0.0274927	752.26877	0.021106	1111.5713	0.00935
65.145203	0.0013122	389.26139	0.2469181	752.27385	0.0261858	1111.5713	0.00935
65.156274	0.0123837	389.26355	0.0006417	752.28377	0.036106	1111.5813	0.01935
65.157524	0.0136337	389.41502	0.0094707	752.29002	0.042356	1111.585	0.0231
65.158774	0.0148837	389.44153	0.0001371	752.98127	0.0113326	1111.59	0.0281
65.168774	0.0248837	390.46752	0.0126422	753.63161	0.0002863	1111.5938	0.03185
65.173778	0.0298877	390.62285	0.0005397	753.63752	0.012724	1111.6	0.038108
65.822518	0.0002842	390.79377	0.0102226	754.51627	0.0238273	1111.7988	0.0086352
65.877524	0.0192001	390.95216	0.001238	755.47502	0.0117123	1111.8038	0.0136352
66.100024	0.0130306	392.59779	0.0006762	755.49627	0.0109172	1111.8038	0.0136352
66.108774	0.0199324	392.70472	0.0003484	756.47987	0.0054876	1111.805	0.0148852
66.293774	0.0137763	393.06321	0.0001367	757.33252	0.0237511	1111.8125	0.0223852
66.476185	0.0003961	393.43345	0.0003823	758.19349	0.0003041	1111.8125	0.0223852
66.673442	0.0010031	393.45366	0.000175	758.57156	0.000192	1111.8275	0.0373852
66.866274	0.0275879	393.61877	0.0156738	759.12044	0.0006138	1111.8275	0.0373852
67.328774	0.0129027	393.88502	0.0280691	759.26597	0.0012774	1111.8988	0.0135762
67.676274	0.0101992	394.95627	0.01027	759.36252	0.015888	1111.9941	9.28E-05
69.808479	0.0001935	395.22752	0.0144485	759.8264	0.0002551	1112.043	0.0002325
69.937341	0.0013394	395.27876	0.0116122	760.93752	0.0096294	1112.1393	0.0003404
70.128756	0.0139653	395.50749	0.0013969	761.24002	0.0238077	1112.5463	0.0210956
70.328774	0.0122762	395.51877	0.0126768	761.73752	0.0151927	1113.1804	0.0011267
70.328774	0.0122762	395.52502	0.0189268	762.22952	0.000251	1113.5563	0.0004907
70.330028	0.0135302	395.52627	0.0201768	762.9624	0.0012838	1113.5566	0.0008021
70.337524	0.0210262	395.53002	0.0239268	763.24502	0.0255723	1113.5566	0.0008457
70.337524	0.0210262	395.53252	0.0264268	763.45158	0.0006544	1113.557	0.0012685
70.346274	0.0297762	395.53377	0.0276768	763.66578	0.0003324	1113.5738	0.0180122
70.346274	0.0297762	395.54878	0.0426808	763.75622	0.0011884	1113.575	0.0192622
70.352524	0.0360262	395.92779	0.0001305	763.81489	0.0020532	1113.5838	0.0280122
70.907998	0.0004291	395.92896	0.0013097	764.02377	0.010988	1113.5925	0.0367622
71.135089	0.0003865	395.93618	0.0085216	764.02583	0.0130452	1114.132	0.0013248
71.451859	0.00118	395.94253	0.0148728	764.03002	0.017238	1114.1425	0.0118854



71.452259	0.0015796	395.94377	0.0161188	764.03002	0.017238	1114.1438	0.0131354
71.462157	0.0114775	395.95002	0.0223688	764.03752	0.024738	1114.15	0.0193854
71.462524	0.0118447	395.95252	0.0248688	764.04002	0.027238	1114.15	0.0193854
71.463774	0.0130947	395.96127	0.0336188	764.04002	0.027238	1114.1538	0.0231354
71.465024	0.0143447	396.40252	0.0215721	764.04627	0.033488	1114.1588	0.0281354
71.468774	0.0220609	396.91517	0.0004552	764.28502	0.041244	1114.1675	0.0368934
71.475024	0.0243447	396.91623	0.0035214	764.66386	0.0003351	1114.4013	0.0153341
71.480028	0.0293487	396.96877	0.0151565	764.93752	0.0162986	1114.4313	0.0111701
72.154949	0.0002267	396.98631	0.0001341	764.97127	0.022299	1114.64	0.0244107
72.176274	0.0119843	397.43002	0.0269822	765.86906	0.0002778	1115.6063	0.0365925
72.381256	0.0233721	397.98004	0.0001897	766.3732	0.0011556	1115.685	0.0055112
73.150316	0.0014357	399.1741	0.0001087	766.88788	0.0014374	1115.6888	0.0092879
73.328774	0.0288474	399.17432	0.0003289	769.07841	0.0009465	1115.6938	0.0142879
73.968142	0.0013052	399.17673	0.0027443	769.28502	0.0115962	1115.7	0.0205379
74.018774	0.011147	399.18752	0.0135349	769.79845	0.0002916	1115.7013	0.0217879
74.118774	0.0123685	399.18877	0.0147849	769.96845	0.0012284	1115.705	0.0255379
74.237788	0.0002371	399.18877	0.0147849	770.34002	0.0189791	1115.7088	0.0292879
74.315495	0.0003502	399.19003	0.0160389	771.09648	0.0001668	1115.7188	0.0392879
74.325868	6.00E-05	399.19878	0.0247889	771.18252	0.0229751	1115.9963	0.0215791
74.327105	0.0012974	399.27009	0.0007616	771.24252	0.0147855	1116.3124	0.0055145
74.330417	0.0046088	399.44502	0.0114254	771.72181	0.0005702	1116.3175	0.0106171
74.337524	0.0117163	399.55184	0.0004166	772.78127	0.0243111	1116.3238	0.0168671
74.342528	0.0167203	399.95127	0.011787	773.07877	0.0144779	1116.33	0.0231171
74.348774	0.0229663	400.06853	0.0001223	773.07877	0.0144779	1116.3313	0.0243671
74.350024	0.0242163	400.09878	0.0093758	773.08003	0.0157319	1116.3338	0.0268671
74.358774	0.0329663	400.10377	0.0143718	773.08752	0.0232279	1116.3338	0.0268671
74.854859	0.0002168	400.10502	0.0156218	773.08752	0.0232279	1116.3338	0.0268671
75.587524	0.011588	400.11252	0.0231218	773.09002	0.0257279	1117.4868	4.20E-05
75.770024	0.0237424	400.11252	0.0231218	773.09002	0.0257279	1117.6461	0.0003012
75.903021	0.0004693	400.11627	0.0268718	773.12127	0.0569779	1117.8244	0.0003665
75.903641	0.0010886	400.12752	0.0381218	773.82908	0.0012595	1117.8338	0.0097833
75.904822	0.0022705	400.12752	0.0381218	774.06877	0.0150185	1117.8338	0.0097833
75.915024	0.012472	400.31485	0.1233515	774.145	0.0018193	1117.8425	0.0185333
75.918774	0.016222	401.19702	0.000518	774.62877	0.0367986	1117.8438	0.0197833
75.920024	0.017472	401.63217	0.0005455	774.65658	0.0011528	1117.8438	0.0197833
75.931274	0.028722	403.22263	0.0007749	774.71536	2.30E-05	1117.8475	0.0235333
75.936278	0.033726	403.84123	0.0001653	775.26691	0.0018893	1117.865	0.0410333
76.336644	0.0011294	404.32502	0.1229162	775.44933	6.00E-05	1118.4151	4.20E-05
76.406274	0.0129953	405.40002	0.0103585	775.61446	0.0001321	1118.8627	0.0003538
76.716274	0.0409383	405.41252	0.0132695	775.99252	0.0159643	1119.1766	0.0013689
76.724639	0.0002826	405.64627	0.0274546	776.06252	0.013598	1119.2301	0.0005333
77.207793	0.0003798	405.67349	4.20E-05	776.83877	0.0262487	1119.24	0.0104863
77.207864	0.0004513	405.67421	0.0007603	776.87502	0.0202159	1119.2425	0.0129903
77.208673	0.0012603	405.67574	0.0022897	777.16823	0.00121	1119.2463	0.0167363
77.218774	0.011361	405.68252	0.0090721	777.66252	0.0145506	1119.25	0.0204863
77.220024	0.012611	405.68377	0.0103221	778.26858	0.0002596	1119.25	0.0204863
77.221274	0.013861	405.68752	0.0140721	778.57079	0.000346	1119.2538	0.0242363
77.231274	0.023861	405.69377	0.0203221	778.63824	0.0002242	1119.2618	0.0007509

77.236278	0.028865	405.69878	0.0253261	778.63842	0.0004	1119.2713	0.0417363
77.27781	0.0008894	406.51154	0.0003938	778.64696	0.0089371	1119.3888	0.0127199
77.417681	0.0004521	407.32472	0.0002269	778.65002	0.0120037	1119.4243	0.0077641
77.649522	4.20E-05	408.40055	0.0011711	778.65127	0.0132537	1119.4275	0.0109388
77.784114	0.0003664	409.12127	0.0105999	778.65127	0.0132537	1119.4275	0.0109388
78.536267	0.0001371	409.14376	0.0170229	778.65252	0.0145037	1119.4313	0.0146888
78.537128	0.0009985	409.21877	0.0139491	778.66753	0.0295077	1119.4338	0.015971
78.537263	0.0011335	409.65877	0.0201465	779.18627	0.0130929	1119.4413	0.0246888
78.546274	0.010144	409.69201	6.36E-05	780.09126	0.0004598	1119.45	0.0334388
78.550024	0.013894	412.44434	0.0010456	780.75525	0.0053623	1119.4563	0.0396888
78.551274	0.015144	412.45252	0.0092255	780.76127	0.0113859	1119.5532	0.0002622
78.556274	0.020144	412.45627	0.0129755	780.76127	0.0113859	1120.2938	0.0348586
78.561278	0.025148	412.45877	0.0154755	780.76752	0.0176359	1120.8317	0.0105266
79.595024	0.0259223	412.46627	0.0229755	780.76877	0.0188859	1121.765	0.0122048
80.000024	0.0138503	412.47127	0.0279755	780.77127	0.0213859	1122.0475	0.0006617
80.927912	0.0001783	412.47502	0.0317255	780.77752	0.0276359	1122.0745	0.0004856
81.332524	0.01125	412.48127	0.0379755	780.78503	0.0351399	1122.2465	0.0004951
81.333545	0.0122707	412.55111	0.0005469	781.05603	0.0003577	1122.3976	0.000651
81.345024	0.02375	412.56252	0.0119636	781.08199	0.0017446	1122.4926	0.0010505
81.346274	0.025	412.56502	0.0144636	781.53377	0.0279417	1122.6938	0.0142425
81.347524	0.02625	412.56502	0.0144636	782.50002	0.0159802	1123.4324	0.0002908
81.348774	0.0275	412.57752	0.0269636	782.54977	0.0007341	1123.6222	0.0003773
81.356274	0.035	412.57877	0.0282136	782.55877	0.0097409	1123.6692	0.001033
81.362532	0.041258	412.58752	0.0369636	782.55877	0.0097409	1123.8481	0.0002435
82.150024	0.0122564	412.58752	0.0369636	782.56252	0.0134909	1124.0088	0.0089569
82.287524	0.0134311	413.22752	0.0171134	782.57252	0.0234909	1124.4063	0.0120064
82.498774	0.015223	414.31877	0.0174462	782.58127	0.0322409	1124.5406	0.0002519
82.552978	0.0020522	414.57142	0.0013176	782.58377	0.0347409	1124.5407	0.000338
82.893339	4.20E-05	414.59943	0.0012885	782.58752	0.0384909	1124.5425	0.0021332
82.893662	0.0003645	414.60627	0.0081368	782.64667	0.0094915	1124.5525	0.0121841
82.894538	0.0012409	414.60877	0.0106368	783.19002	0.0239188	1124.5575	0.0171841
82.901274	0.0079768	414.61502	0.0168868	783.38118	0.0002486	1124.5625	0.0221841
82.906274	0.0129768	414.62252	0.0243868	783.85668	0.0002708	1124.5638	0.0234341
82.907524	0.0142268	414.62752	0.0293868	784.74879	0.0012728	1124.5675	0.0271881
82.908774	0.0154768	414.63127	0.0331368	785.81675	0.000361	1125.185	0.0159598
82.917528	0.0242308	414.65002	0.0518868	785.81686	0.0004672	1125.375	0.0171625
82.940024	0.0104348	415.0128	0.0010079	785.82451	0.0081161	1125.673	0.0002901
83.035024	0.0379888	415.02377	0.0119826	785.82752	0.0111339	1125.8285	0.0003046
83.067524	0.0239603	415.02377	0.0119826	785.83127	0.0148839	1126.4513	0.0136375
83.450024	0.0111241	415.03002	0.0182326	785.83252	0.0161339	1126.8048	0.0002522
83.516394	0.0002874	415.03127	0.0194826	785.84252	0.0261339	1127.0144	0.0001467
83.689744	0.0003404	415.03377	0.0219826	785.84377	0.0273839	1127.0154	0.0012028
85.021954	0.0006777	415.04002	0.0282326	786.79738	0.0003642	1127.0156	0.0013625
86.311274	0.0257364	415.05877	0.0469826	787.76252	0.0095289	1127.0158	0.0015562
86.7789	0.0003659	415.63952	0.0010322	787.85996	0.0005978	1127.0164	0.0022042
87.325024	0.0155689	416.04725	0.0015502	788.10881	0.0003031	1127.0413	0.0270694
87.701274	0.0079277	416.23127	0.0133278	788.19528	0.0014146	1127.0425	0.0283234
87.936274	0.0131132	416.26877	0.1494565	788.41243	0.0003261	1127.0438	0.0295694

90.118774	0.0107522	416.62169	0.0005587	788.73182	0.0009003	1127.2949	0.0012536
90.606274	0.0164038	416.62188	0.0007528	789.16752	0.0124794	1127.4868	0.0012959
90.915024	0.0360528	416.62223	0.0011042	789.61877	0.0356686	1127.9013	0.0107117
91.602465	0.000347	416.6228	0.0016703	789.76852	0.0021598	1128.5268	0.0011069
92.091384	0.0013316	416.6296	0.0084746	789.77502	0.0086625	1128.8393	0.0002395
92.247601	0.0030027	416.64377	0.0226453	789.77752	0.0111625	1128.8638	0.0082065
92.252524	0.0079255	416.64878	0.0276493	789.77752	0.0111625	1129.285	0.0248481
92.256274	0.0116755	416.66002	0.0388953	789.79127	0.0249125	1129.4385	0.0003663
92.258774	0.0141755	416.74502	0.0171936	789.79627	0.0299125	1129.5984	0.0004009
92.271274	0.0266755	416.76627	0.029234	789.80002	0.0336625	1129.6438	0.0144703
92.272524	0.0279255	417.26877	0.0395857	789.80627	0.0399125	1129.9835	0.000581
92.281274	0.0366755	417.39377	0.0119395	790.39721	0.0010452	1130.1233	0.0003745
92.281274	0.0366755	418.24241	0.0010769	790.40877	0.0126121	1130.328	0.000491
92.809019	0.0007386	420.0657	0.0013662	790.40877	0.0126121	1130.38	0.0117845
93.531715	0.0013214	421.76127	0.0127392	790.41128	0.0151161	1130.4324	0.0004356
93.543774	0.0133804	421.76127	0.0127392	790.41627	0.0201121	1131.2428	0.000427
93.545024	0.0146304	421.76127	0.0127392	790.41877	0.0226121	1132.3985	0.0004389
93.550024	0.0196304	421.76196	0.0134297	790.41877	0.0226121	1132.4486	0.0007932
93.551274	0.0208804	421.76877	0.0202392	790.43377	0.0376121	1132.5363	0.0277802
93.555024	0.0246304	421.77267	0.0012315	791.70127	0.0257796	1132.625	0.0161516
93.558774	0.0283804	421.77752	0.0289892	792.66241	0.0005402	1132.6451	0.0009473
93.567528	0.0371344	421.77752	0.0289892	792.74627	0.0226515	1132.8527	0.0008476
94.708774	0.0208777	421.79002	0.0414892	792.95744	0.0004441	1133.15	0.0117166
94.931274	0.0195397	422.36257	0.0015256	793.03627	0.0128293	1133.85	0.0111144
95.215024	0.0190414	422.68127	0.0139189	793.93127	0.0106487	1134.3722	0.0002897
95.511201	0.0002139	423.28406	0.0007077	794.77589	0.0002948	1134.4651	0.0010724
96.082352	0.0009279	423.36476	0.0004231	795.92279	0.0003328	1134.4738	0.0097394
96.092524	0.0110996	424.5268	0.0012094	795.93627	0.0138218	1134.48	0.0159894
96.093774	0.0123496	424.53627	0.0106844	795.93752	0.0150718	1134.4863	0.0222394
96.106274	0.0248496	424.53752	0.0119344	795.94377	0.0213218	1134.4875	0.0234894
96.108774	0.0273496	424.55002	0.0244344	795.94627	0.0238218	1134.49	0.0259894
96.110024	0.0285996	424.55002	0.0244344	795.94752	0.0250718	1134.49	0.0259894
96.112524	0.0310996	424.55377	0.0281844	795.95002	0.0275718	1134.49	0.0259894
96.123782	0.0423576	424.55877	0.0331844	795.95377	0.0313218	1135.03	0.0343372
96.54307	0.0007515	424.56003	0.0344384	796.56295	0.0002596	1135.6729	7.96E-05
96.807524	0.0094669	424.91897	0.0004407	796.83565	0.0011087	1136.4247	0.0006859
96.920024	0.0221923	425.13324	0.0002017	797.17583	0.0002081	1136.4291	6.00E-05
97.478473	0.0005556	425.13339	0.0003541	797.47126	0.024056	1136.4863	0.0285586
97.775024	0.0171074	425.13423	0.0011895	797.49602	0.0046962	1137.0414	0.0004009
97.872524	0.0111772	425.14095	0.0079086	797.53127	0.0126383	1137.2075	0.037556
97.872524	0.0111772	425.15503	0.0219886	797.66593	0.0007432	1137.2125	0.0138585
97.873774	0.0124272	425.15627	0.0232346	797.66823	0.0030436	1137.2524	0.0007729
97.880032	0.0186852	425.15877	0.0257346	797.67627	0.0110888	1137.3875	0.0091397
97.881274	0.0199272	425.16127	0.0282346	797.67752	0.0123388	1137.5657	4.20E-05
97.881274	0.0199272	425.31843	0.1225391	797.67821	0.0130245	1137.8226	0.000289
97.896274	0.0349272	425.40492	0.0007033	797.68127	0.0160888	1138.1308	4.20E-05
97.902524	0.0411772	425.56127	0.0130448	797.69252	0.0273388	1138.7893	0.002078
100.1528	0.0003935	426.08752	0.0211879	797.69377	0.0285888	1138.8003	0.0002279

100.15308	0.0006655	426.45497	0.0095611	797.82694	0.0002902	1138.8976	0.0007485
100.15396	0.0015447	426.45502	0.0096187	798.33628	0.0097573	1138.9746	0.0011981
100.16141	0.0090002	426.46252	0.0171187	798.34127	0.0147533	1139.5297	0.0002039
100.16753	0.0151174	426.46877	0.0233687	798.34252	0.0160033	1139.7675	0.0162363
100.17502	0.0226134	426.46877	0.0233687	798.34752	0.0210033	1140.2449	0.000137
100.17752	0.0251134	426.47127	0.0258687	798.35002	0.0235033	1140.8576	0.0002882
100.18002	0.0276134	426.47252	0.0271187	798.35002	0.0235033	1140.8597	0.0023359
100.48474	0.0003938	426.49253	0.0471267	798.36502	0.0385033	1140.8629	0.0056146
101.25524	0.0002665	427.12347	0.0001098	798.36502	0.0385033	1140.8688	0.011455
101.4806	0.0006496	427.12361	0.0002512	798.45377	0.0226631	1140.87	0.012705
101.85252	0.0280651	427.12625	0.0028975	798.82496	0.0005164	1140.8713	0.013959
101.91252	0.0146715	427.13628	0.0129207	799.10002	0.0118802	1140.8825	0.025205
102.26354	0.0002643	427.13752	0.0141667	800.09447	4.20E-05	1140.8863	0.028955
102.70781	0.0002923	427.14877	0.0254167	800.26252	0.0127589	1141.3842	4.20E-05
102.83271	0.0005459	427.15252	0.0291667	800.27502	0.0104145	1141.7063	0.0088726
102.84377	0.0116125	427.16252	0.0391667	800.72502	0.0237333	1141.7075	0.0101226
102.84627	0.0141125	427.31992	0.0002715	801.04041	0.0001713	1141.7077	0.0102787
102.84627	0.0141125	427.51296	0.0002208	801.15249	0.0001566	1141.7188	0.0213726
102.85877	0.0266125	427.51562	0.0028772	801.84343	0.0011248	1141.72	0.0226226
102.86002	0.0278625	427.51713	0.0043913	801.99627	0.0121854	1141.7213	0.0238726
102.86877	0.0366125	427.52502	0.0122859	802.46717	0.0003193	1141.7238	0.0263726
102.86878	0.0366165	427.52752	0.0147859	802.47377	0.0241972	1141.73	0.0326266
103.29488	0.0008375	427.53752	0.0247859	802.67627	0.0204546	1142.9175	0.0257768
103.36627	0.0235946	427.53877	0.0260359	802.68252	0.0211778	1142.9692	0.0004539
104.26877	0.0206256	427.54253	0.0297899	803.19878	0.0003354	1142.9784	0.000153
104.48813	0.0005998	427.99006	0.0004332	803.33877	0.0083871	1146.2478	0.0009755
104.74208	0.0001372	428.78127	0.011233	803.79043	0.0007259	1146.547	4.20E-05
104.98387	0.0013722	429.38664	0.00032	803.80634	0.0166373	1146.5473	0.0003823
105.02503	0.0001054	429.41152	0.0003335	803.80752	0.0178239	1146.5476	0.0006646
105.6814	0.0004205	429.69377	0.0096837	803.81252	0.0228239	1146.5489	0.0019518
105.99407	0.0012274	429.79415	0.0010002	803.81377	0.0240739	1146.5575	0.0105802
106.17752	0.0340313	429.95627	0.0189616	803.81502	0.0253239	1146.5575	0.0105802
106.20823	0.0014292	430.06749	0.0002191	803.81752	0.0278239	1146.5625	0.0155802
106.98658	0.0003538	432.33705	0.0005099	803.82378	0.0340779	1146.5738	0.0268342
108.01832	0.0023052	432.83126	0.0149486	803.87992	0.0114056	1146.657	0.0006524
108.03002	0.0140093	432.93236	0.0007279	803.9665	0.0002653	1147.1775	0.0003074
108.03752	0.0215093	433.14191	0.0010638	803.96731	0.0010839	1147.1785	0.0012832
108.03752	0.0215093	433.38553	0.0008735	803.96763	0.0014046	1147.1794	0.0021825
108.03752	0.0215093	433.62838	0.0001329	803.97627	0.0100441	1147.1888	0.0115904
108.04002	0.0240093	433.74339	0.0015221	803.97752	0.0112941	1147.19	0.0128404
108.04127	0.0252593	433.84546	0.000601	803.98127	0.0150441	1147.1938	0.0165904
108.04752	0.0315093	434.4045	0.001598	803.98752	0.0212941	1147.205	0.0278444
108.29338	0.0009864	434.44325	0.0003233	803.99253	0.0262981	1147.2063	0.0290904
108.40002	0.0141315	434.51502	0.0203402	804.40827	4.20E-05	1147.5985	0.0023589
108.83751	0.0005852	435.18656	0.0003672	804.55252	0.0160205	1148.1556	0.0012738
108.8876	0.0003868	436.57502	0.019332	804.56002	0.0114254	1148.169	0.0146612
109.15002	0.0136433	437.13561	0.000291	804.56627	0.0176754	1148.175	0.0206745
109.35908	0.0001277	437.16627	0.0098379	804.56752	0.0189254	1148.1763	0.0219245

110.71915	0.0007457	437.17252	0.0160879	804.56877	0.0201754	1148.1763	0.0219245
110.72056	0.0021558	437.17377	0.0173379	804.57502	0.0264254	1148.18	0.0256745
110.72159	0.0031869	437.17378	0.0173459	804.57752	0.0289254	1148.1838	0.0294245
110.72752	0.00912	437.18127	0.0248379	804.57752	0.0289254	1148.1925	0.0381785
110.73127	0.01287	437.18752	0.0310879	804.59002	0.0414254	1148.3225	0.0116865
110.73752	0.01912	437.19627	0.0398379	804.98252	0.0210889	1148.3225	0.0116865
110.73877	0.02037	437.19627	0.0398379	805.25601	0.0002811	1148.3238	0.0129405
110.74253	0.024124	437.39696	0.0010649	805.57502	0.0113463	1148.3313	0.0204365
111.39455	0.0002173	437.87729	0.0012908	806.33877	0.0133	1148.3313	0.0204365
112.98389	0.0001889	437.97447	0.0011934	807.03131	4.20E-05	1148.34	0.0291865
113.10877	0.0231648	439.03128	0.0005486	807.38127	0.0114445	1148.34	0.0291865
113.59752	0.0391162	439.30612	0.0012124	807.72502	0.0116199	1148.3463	0.0354365
113.94316	0.0019766	439.48887	0.0003064	808.01178	0.0015087	1148.7525	0.0211643
113.94329	0.0021098	439.68106	0.0001189	808.41877	0.0131118	1148.753	0.0008332
113.94377	0.01305	439.75752	0.0122737	808.56002	0.0010529	1148.7848	0.0031
113.94622	0.0050452	440.94677	0.0001047	808.83508	6.00E-05	1148.9673	0.0007786
113.95127	0.0100953	440.98508	7.36E-05	808.8941	0.0005587	1148.975	0.0085355
113.95627	0.0150953	441.02207	0.0021701	809.088	0.0009044	1148.9775	0.0110355
113.95877	0.0175953	441.02752	0.0076231	809.18874	0.0004923	1148.9838	0.0172855
113.96252	0.0213453	441.03127	0.0113731	809.34139	0.0013879	1148.9913	0.0247855
113.96753	0.0263493	441.03377	0.0138731	809.34877	0.0087758	1148.9963	0.0297855
114.04754	0.0002861	441.04627	0.0263731	809.35502	0.0150258	1149	0.0335355
114.3601	0.0011268	441.04752	0.0276231	809.35502	0.0150258	1149.0063	0.0397855
114.49627	0.0225514	441.05627	0.0363731	809.36252	0.0225258	1149.5349	0.0014868
114.75414	0.0003746	441.05627	0.0363731	809.36502	0.0250258	1149.6403	0.0020469
114.77086	0.0005502	441.35002	0.0105567	809.36502	0.0250258	1149.65	0.0113536
114.97321	0.0001385	441.62627	0.0180341	809.37877	0.0387758	1149.6999	8.60E-05
115.57377	0.0170613	441.7915	6.00E-05	809.75002	0.01082	1149.7008	0.0010299
116.72127	0.0231008	441.82502	0.0145015	810.38751	0.0171404	1149.7011	0.0012793
117.41627	6.00E-05	442.04126	0.015932	811.01627	0.0360356	1149.7013	0.0015109
118.30158	0.0003111	442.06252	0.0137195	811.51501	0.0003146	1149.7019	0.0021652
118.30159	0.0003292	442.24377	0.0145551	811.51548	0.0007828	1149.7188	0.0189981
118.30272	0.0014526	442.25304	0.0003311	811.51612	0.0014156	1149.7225	0.0227481
118.31377	0.0125086	442.26178	0.1002159	811.52627	0.0115741	1149.7238	0.0240021
118.31377	0.0125086	442.45627	0.0118326	811.52752	0.0128241	1149.9188	0.0287382
118.32502	0.0237586	442.95413	0.0016901	811.53127	0.0165741	1150.4282	0.0081354
118.33003	0.0287626	442.97252	0.0278502	811.53752	0.0228241	1151.0661	0.0015087
118.59377	0.0150005	442.99217	0.0011023	811.54253	0.0278281	1151.0859	0.000384
120.16127	0.0102988	443.34502	0.0372676	811.94128	0.0076797	1151.2555	0.0077571
120.5216	0.0004892	445.65144	0.0010361	812.23127	0.0241291	1151.3538	0.0102473
120.53002	0.0089137	445.80129	0.0026632	812.96016	0.0010316	1151.355	0.0115133
120.53752	0.0164137	445.80627	0.0076481	813.15142	4.20E-05	1151.36	0.0164973
120.54377	0.0226637	445.81377	0.0151481	813.24377	0.014186	1151.3613	0.0177473
120.54377	0.0226637	445.81877	0.0201481	813.45348	0.0001147	1151.3625	0.0189973
120.54627	0.0251637	445.82002	0.0213981	813.45361	0.0002408	1151.3688	0.0252473
120.54752	0.0264137	445.82377	0.0251481	813.45376	0.0003863	1151.3775	0.0339973
120.55503	0.0339177	445.82752	0.0288981	813.46753	0.0141577	1151.3838	0.0402473
121.37502	0.0241108	445.83628	0.0376521	813.46877	0.0154037	1152.0007	0.0004695

121.39617	0.0005567	446.84241	0.0001504	813.47752	0.0241537	1152.0088	0.0085465
121.41252	0.016908	446.86877	0.0140525	813.48002	0.0266537	1152.0213	0.0210465
121.41752	0.021908	447.32217	0.0011498	813.49377	0.0404037	1152.0225	0.0222965
121.41877	0.023158	448.26135	0.1618824	813.94877	0.0128004	1152.0238	0.0235505
121.41877	0.023158	448.28377	0.0228657	814.35127	0.0091396	1152.025	0.0247965
121.42127	0.025658	448.43752	0.0225867	814.79882	0.0011796	1152.025	0.0247965
121.42252	0.026908	448.54055	0.0008432	814.97653	0.0006748	1152.04	0.0397965
121.44253	0.046912	448.62935	0.0013636	815.53035	0.0006027	1152.3511	0.0018934
121.59377	0.0120968	448.63752	0.0095346	815.53752	0.007772	1153.4375	0.0127714
122.03814	0.0003489	448.63877	0.0107846	815.54002	0.010272	1153.6267	0.0010967
122.41877	0.0137237	448.65127	0.0232846	815.54002	0.010272	1153.6825	0.0013498
122.49116	0.0001749	448.65377	0.0257846	815.55377	0.024022	1153.7	0.0140966
122.98309	0.0006321	448.65502	0.0270346	815.55877	0.029022	1153.7833	0.0006541
122.98316	0.0006955	448.65877	0.0307846	815.56252	0.032772	1153.7835	0.0008122
122.9834	0.0009417	448.66252	0.0345346	815.56877	0.039022	1153.7838	0.0010731
122.98344	0.0009804	448.69459	0.0004077	816.52502	0.010239	1153.784	0.0012835
122.98565	0.0031857	448.80002	0.0134138	816.59377	0.0119157	1153.7901	0.0074258
123.00627	0.0238116	449.0712	0.0003199	816.70002	0.0114457	1153.8063	0.0235906
123.01128	0.0288156	450.53752	0.0089376	816.71252	0.0166635	1153.81	0.0273406
123.02252	0.0400616	450.63715	0.0004257	816.74291	0.0005579	1153.8113	0.0285946
123.22427	0.0003255	451.24045	0.0008153	816.7814	0.0003218	1154.1113	0.0119583
123.41127	0.0238343	451.36877	0.0159781	817.07572	0.0004736	1154.2614	0.001065
123.62563	0.0100367	451.60627	0.0118113	817.83002	0.028967	1154.4183	0.0007154
123.65877	0.0169496	451.77384	0.0012213	818.08842	0.0004535	1154.5628	0.0014231
124.64672	0.000186	451.93127	0.0171642	818.59374	0.0003122	1155.9005	4.20E-05
124.79252	0.0155514	454.40752	0.0203885	819.09475	0.0005787	1156.3125	0.0121619
125.61502	0.013687	454.60252	0.0202406	819.10502	0.0108564	1156.4614	0.0007462
125.92627	0.0252443	455.04377	0.0133997	819.10502	0.0108564	1156.4624	0.001758
125.96382	0.0003981	455.31584	0.1434181	819.11127	0.0171064	1156.4625	0.0018551
126.71252	0.0156279	455.32377	0.1032221	819.11877	0.0246064	1156.4627	0.0020449
127.19982	0.0002871	455.45522	0.0002945	819.12127	0.0271064	1156.47	0.0093922
127.52377	0.0246441	455.45541	0.0004794	819.12127	0.0271064	1156.475	0.0143922
127.56357	0.0001447	455.45548	0.0005564	819.12127	0.0271064	1156.4763	0.0156422
127.57262	4.20E-05	455.45579	0.0008609	819.48127	0.0157851	1156.4863	0.0256462
127.8163	0.0005361	455.46377	0.0088477	820.36221	0.0001301	1156.6575	0.014511
127.82752	0.0117625	455.46377	0.0088477	820.36231	0.000231	1156.6625	0.0009645
127.82752	0.0117625	455.46877	0.0138477	820.3627	0.0006174	1156.7359	0.0006441
127.83127	0.0155125	455.48003	0.0251017	820.37002	0.0079456	1156.7463	0.0109842
127.84002	0.0242625	455.55752	0.0228232	820.37502	0.0129456	1156.7488	0.0134882
127.84127	0.0255125	455.70784	0.0005466	820.37627	0.0141956	1156.7525	0.0172342
127.85627	0.0405125	455.85472	0.0006804	820.37752	0.0154456	1156.7563	0.0209842
127.85627	0.0405125	455.86752	0.0134804	820.38628	0.0241996	1156.7563	0.0209842
129.87377	0.0126446	455.86752	0.0134804	820.4225	0.000275	1156.76	0.0247342
129.87377	0.0126446	455.87377	0.0197304	820.42309	0.0008677	1156.7775	0.0422342
129.87598	0.0148464	455.87502	0.0209804	820.42319	0.0009619	1156.965	0.0229569
129.88127	0.0201446	455.87752	0.0234804	820.42343	0.0012074	1157.2375	0.0157436
129.88377	0.0226446	455.88377	0.0297304	820.4235	0.0012726	1157.9063	0.0361677
129.88627	0.0251446	455.89128	0.0372344	820.44377	0.0215502	1158.0825	0.0008466

129.89002	0.0288946	456.34944	0.0012102	820.44752	0.0253002	1158.7459	0.0011959
129.89002	0.0288946	456.62104	0.0007185	820.44878	0.0265542	1159.1375	0.0112999
129.94002	0.0142831	456.63127	0.0109531	820.44978	0.0005742	1159.6463	0.0240143
130.47081	0.0002312	456.63377	0.0134531	820.46127	0.0120691	1160.8615	0.0019378
130.55752	0.0263522	456.64002	0.0197031	820.46252	0.0133191	1160.9313	0.0121995
130.59345	0.0010157	456.64627	0.0259531	820.46877	0.0195691	1160.9813	0.0152913
130.69485	0.0002565	456.64752	0.0272031	820.46877	0.0195691	1161.3627	0.0001149
130.99752	0.0139229	456.65627	0.0359531	820.47252	0.0233191	1161.378	0.0027049
131.03752	0.0120536	456.65627	0.0359531	820.47752	0.0283191	1161.3875	0.0122147
131.14473	0.0007816	457.63106	0.0003054	820.48628	0.0370771	1161.3888	0.0134647
131.44572	0.0003726	457.63138	0.000629	820.68752	0.0094225	1161.395	0.0197147
131.69691	4.20E-05	457.63224	0.0014857	821.64627	0.0099445	1161.4	0.0247147
131.69916	0.0002838	457.64877	0.0180231	821.66627	0.0115808	1161.4025	0.0272147
131.70146	0.0009826	457.65002	0.0192731	821.66627	0.0115808	1161.405	0.0297147
131.75502	0.0242612	457.65002	0.0192731	821.67377	0.0190808	1161.4125	0.0372187
132.14137	0.0003632	457.65502	0.0242731	821.67502	0.0203308	1161.9	0.0159164
132.59377	0.0126343	457.65877	0.0280231	821.67502	0.0203308	1162.495	0.0005641
132.71939	0.0004663	458.76059	0.0005104	821.68377	0.0290808	1162.4962	0.001677
132.82958	0.0004151	459.26346	0.0003829	821.68377	0.0290808	1162.497	0.002493
133.04271	0.0003204	459.33877	0.1227126	821.69002	0.0353308	1162.497	0.0025763
133.38178	0.0022931	459.70627	0.0194437	821.69377	0.0124679	1162.5063	0.0118009
133.40208	0.003755	461.19377	0.0121038	822.19855	0.0003859	1162.5075	0.0130509
133.47284	0.0011756	461.2711	0.0005475	822.23397	0.0002114	1162.5088	0.0143009
133.48627	0.0146127	461.4444	0.0002667	822.41753	0.0104402	1162.5238	0.0293049
133.48627	0.0146127	461.72594	0.0020428	822.41769	0.0106007	1162.6938	0.0121181
133.48627	0.0146127	461.73627	0.0123759	822.42502	0.0179362	1162.7335	0.0014543
133.49377	0.0221127	461.73752	0.0136259	822.43127	0.0241862	1163.6513	0.0248135
133.49627	0.0246127	461.74377	0.0198759	822.43127	0.0241862	1164.525	0.0115282
133.49627	0.0246127	461.74377	0.0198759	822.43377	0.0266862	1164.5375	0.0108023
133.50377	0.0321127	461.75252	0.0286259	822.43502	0.0279362	1165.5395	0.0002015
133.52252	0.0243638	461.75377	0.0298759	822.44253	0.0354402	1166.8125	0.0146286
134.56252	0.0236606	461.76003	0.0361299	822.51752	0.0147264	1166.9761	0.0004841
134.64877	0.0282686	462.18404	0.000495	823.16932	0.0005226	1167.2963	0.0117694
135.14742	0.0004553	463.16252	0.0231553	823.22002	0.0217666	1167.5255	0.0007615
135.30857	0.0002491	463.78211	0.0006131	824.17026	0.0004931	1167.69	0.0236576
135.30892	0.0005943	464.46502	0.0116408	824.31356	0.0004626	1168.4156	6.23E-05
135.30914	0.0008186	464.75968	0.0002922	824.32752	0.017313	1168.6911	0.0014503
135.3093	0.000976	464.77139	0.0017111	824.36252	0.0088867	1168.7498	0.0001947
135.31048	0.0021541	464.78002	0.0103402	825.0096	0.0008638	1168.7499	0.0003078
135.33502	0.0266988	464.78127	0.0115902	825.37502	0.0082955	1168.7538	0.0132267
135.33627	0.0279488	464.79377	0.0240902	825.40185	0.000153	1168.7575	0.0078854
135.33752	0.0291988	464.79377	0.0240902	825.41502	0.0133292	1168.7575	0.0078854
135.39127	0.01153	464.79627	0.0265902	825.41502	0.0133292	1168.7625	0.0128854
138.6177	0.0003979	464.79752	0.0278402	825.41753	0.0158332	1168.7643	0.0146827
139.33041	0.00079	464.80127	0.0136235	825.42253	0.0208332	1168.7738	0.0241394
139.33123	0.0016056	464.81127	0.0415902	825.42502	0.0233292	1169.1261	0.0003622
139.33137	0.0017471	464.85627	0.0168346	825.43127	0.0295792	1169.6313	0.0129887
139.33156	0.0019332	465.46751	0.028694	825.44002	0.0383292	1169.758	0.0003561

139.33274	0.0031138	465.5926	0.0002844	826.21675	0.0001978	1169.8238	0.029637
139.35002	0.0204005	465.75061	0.0020308	826.21724	0.0006909	1170.5843	0.00126
139.35377	0.0241505	466.31822	0.0104171	826.21973	0.0031807	1171.0013	0.0109715
139.35503	0.0254045	466.3448	0.0007876	826.23003	0.0134765	1171.4857	0.0002687
139.37627	0.0232232	466.44062	0.0003595	826.23127	0.0147225	1171.5029	0.0006219
139.86252	0.0119682	466.47068	0.0006297	826.23752	0.0209725	1172.1	0.0002485
140.82288	0.0011992	466.47136	0.001305	826.24252	0.0259725	1172.257	0.0002038
140.92958	0.0013481	466.47175	0.0017035	826.24627	0.0297225	1172.7039	0.0009876
141.29568	0.0004817	466.48252	0.0124731	826.77502	0.022408	1173.612	0.0012834
141.51877	0.0117766	466.48252	0.0124731	827.24252	0.0295701	1173.6424	0.0005733
141.80504	0.0033343	466.48377	0.0137231	827.28502	0.0372542	1174.019	0.001303
141.81252	0.0108204	466.49377	0.0237231	827.70627	0.01954	1175.0938	0.011776
141.82002	0.0183204	466.50502	0.0349731	827.96877	0.0114396	1175.2113	4.20E-05
141.82502	0.0233204	467.38377	0.0234976	828.27502	0.0276918	1176.7038	0.0073856
141.82627	0.0245704	467.43869	0.000797	828.33502	0.015499	1177.049	0.0004812
141.82752	0.0258204	468.24664	0.0008347	828.56594	0.0007154	1177.071	0.0003675
141.83002	0.0283204	469.59377	0.0164848	828.75502	0.0173753	1177.1663	0.0283634
141.83628	0.0345744	469.96445	0.0002157	828.83643	0.0002892	1177.5159	0.0011335
142.24527	0.0011217	470.79877	0.0124971	829.52603	4.20E-05	1178.4086	0.0002095
143.52223	0.000478	470.8584	0.0006224	829.52712	0.0011328	1178.855	0.0118725
143.53627	0.0145175	470.89153	0.0013488	829.52716	0.0011741	1178.8998	0.0004008
143.53752	0.0157675	471.33252	0.1826315	829.53877	0.0127873	1180.0704	0.0006516
143.54377	0.0220175	471.46751	0.0245795	829.53877	0.0127873	1180.8366	0.0002661
143.54377	0.0220175	471.93744	0.0006848	829.54002	0.0140373	1181.2538	0.026385
143.54752	0.0257675	472.06252	0.0113341	829.54377	0.0177873	1181.2779	0.0034773
143.55252	0.0307675	472.79377	0.0142206	829.55503	0.0290413	1181.8895	0.0016204
143.55377	0.0320175	472.84252	0.0173841	829.62718	0.0003962	1182.2215	0.0007812
144.31502	0.0221613	472.95919	0.0007882	829.92396	0.0003094	1182.2313	0.0105623
144.42002	0.0229774	473.24559	0.0011439	830.07613	0.0002806	1182.2388	0.0180623
144.70805	0.0012443	473.32502	0.2259229	830.63719	0.0007108	1182.2438	0.0230623
144.74897	0.0002467	473.93127	0.0247371	830.8958	0.0002701	1182.245	0.0243123
146.14502	0.0243588	474.32127	0.0129844	830.8961	0.0005691	1182.2488	0.0280623
146.34297	0.000931	474.51877	0.0112945	830.89855	0.0030192	1182.2563	0.0355623
146.43499	0.0023319	476.24877	0.0276535	830.90752	0.0119929	1182.9697	0.0005007
146.67318	0.0022338	476.30522	0.0007001	830.90877	0.0132429	1183.025	0.0137046
146.68252	0.0115765	477.28127	0.0135122	830.91252	0.0169929	1184.2853	0.0007015
146.68752	0.0165765	477.36493	0.000526	830.91877	0.0232429	1184.995	0.0003716
146.69377	0.0228265	477.41377	0.0002861	830.92392	0.0283922	1184.9958	0.0012337
146.69502	0.0240765	477.42609	0.0007695	830.92752	0.0121137	1184.9967	0.0021327
146.69627	0.0253265	477.60833	0.0008705	831.20186	0.0001916	1185.0075	0.012945
146.69877	0.0278265	477.66331	0.0002497	831.38262	0.0013361	1185.0088	0.014195
146.70627	0.0353265	477.66371	0.0006451	831.83738	0.0104256	1185.0125	0.017945
146.91377	0.0092056	477.67134	0.008275	832.49798	0.0002325	1185.0188	0.024195
146.99627	0.0249764	477.67502	0.0119591	833.58017	6.00E-05	1185.0238	0.029199
147.40877	0.01085	477.67627	0.0132091	833.77002	0.0273607	1185.0488	0.000219
147.57752	0.0251808	477.67752	0.0144591	833.77897	0.0003962	1185.0495	0.0009821
148.00002	0.0170751	477.68252	0.0194591	833.77946	0.000882	1185.0498	0.0012844
149.28048	0.0009418	477.69253	0.0294631	833.77982	0.0012438	1185.05	0.0014054



151.53927	0.0002026	477.73528	0.0009394	833.7802	0.0016256	1185.0501	0.0014896
151.77877	0.0102399	477.88127	0.0161612	833.78076	0.0021837	1185.0688	0.0202097
152.53252	0.0111944	477.89255	0.0003466	833.80002	0.0214484	1185.0725	0.0239597
154.81607	0.0011208	478.2449	0.0003421	833.80503	0.0264524	1185.0738	0.0252137
154.95252	0.0232715	478.26216	0.1160581	833.81627	0.0376984	1185.4806	0.000762
155.04366	0.0002074	478.61252	0.0123413	833.96502	0.0226541	1186.7349	0.000277
155.28698	0.0003724	478.69958	0.0022239	835.22789	0.0003162	1187.3006	0.0002668
155.49738	0.0013176	479.71782	0.0006395	836.07108	0.0009814	1187.3188	0.0237624
155.5131	0.0003628	480.24867	0.0001272	836.21542	0.0002651	1188.0263	0.0087219
155.68252	0.0270537	480.61762	0.0003094	836.53877	0.0235285	1188.14	0.0256428
155.85877	0.0214075	480.78818	0.0002019	836.62502	0.0162354	1188.2592	0.0002146
156.25002	0.0117124	481.41925	0.0007508	837.29492	0.0002224	1189.1222	0.0017219
156.96733	0.0009844	481.48469	0.000194	837.64246	0.0016301	1189.2013	0.0010237
157.24495	0.0006318	481.48486	0.0003684	837.66798	0.0002421	1189.215	0.0147746
157.48502	0.0281489	481.48488	0.0003884	838.50081	0.001133	1189.215	0.0147746
157.61127	0.0171892	481.48528	0.0007923	838.50095	0.0012719	1189.2188	0.0185246
157.86741	0.0007528	481.48611	0.0016193	838.50691	0.0072328	1189.2275	0.0272746
158.42033	0.0006036	481.49878	0.0142855	838.50752	0.0078469	1189.2288	0.0285246
158.53749	0.0016869	481.50877	0.0242815	838.50877	0.0090969	1189.2375	0.0372746
158.67587	0.0002335	481.51127	0.0267815	838.51252	0.0128469	1189.2438	0.0435246
158.84002	0.0234981	481.51252	0.0280315	838.52378	0.0241009	1189.7534	0.0004809
158.92252	0.0105654	481.52627	0.0131878	838.52502	0.0253469	1190.2739	0.0003147
159.81252	0.0143483	482.42797	0.0007956	838.69793	0.0014679	1190.3869	0.0003683
159.98095	4.20E-05	483.04218	0.0004447	838.70627	0.0098117	1190.5563	0.0336193
160.15688	0.0007865	483.93131	0.0007581	838.70752	0.0110617	1191.3595	0.0007855
160.55252	0.0226706	483.97502	0.0142071	838.71877	0.0223117	1191.3813	0.0101037
160.69877	0.0113098	484.75127	0.0130711	838.72002	0.0235617	1191.4225	0.0145396
161.0682	0.002411	484.855	0.0003113	838.72127	0.0248117	1191.8438	0.0118703
161.06951	0.0037234	484.87501	0.0002631	838.72377	0.0273117	1192.3046	0.0004227
161.07069	0.0048969	485.07293	0.0012987	838.73127	0.0348117	1193.293	0.0009029
161.07224	0.0064494	485.29902	0.0003218	838.87752	0.0206414	1193.5804	0.0011514
161.08127	0.0154856	485.41002	0.0251715	839.61764	0.000846	1194.175	0.0127426
161.08252	0.0167356	485.60603	0.0003084	840.46252	0.013368	1195.0813	0.0127201
161.08252	0.0167356	485.81849	0.0003089	840.60752	0.01133	1195.1996	0.0001964
161.09253	0.0267396	485.89518	0.0004581	840.62377	0.015088	1195.5233	0.0002293
161.37127	0.0216003	486.10765	0.000461	840.768	0.0053118	1195.6813	0.0172545
161.38836	0.0003932	486.57704	6.00E-05	840.8264	0.0091667	1196.1605	0.0004453
161.93723	0.0003807	486.57733	0.000357	840.89742	0.0004451	1196.1612	0.0011763
162.16252	0.0222593	486.57801	0.001029	841.63866	0.001911	1196.1618	0.0017636
162.38752	0.0104114	486.57818	0.001199	841.64627	0.0095268	1196.17	0.010013
162.47435	0.000323	486.58776	0.0107791	841.65002	0.0132768	1196.1713	0.011263
162.47586	0.0002644	486.60377	0.0267967	841.65252	0.0157768	1196.175	0.015013
162.63849	0.0008433	486.60502	0.0280467	841.66002	0.0232768	1196.1813	0.021263
163.25668	0.0003221	486.60627	0.0292967	841.66502	0.0282768	1196.1863	0.026267
163.27633	0.0004419	486.90844	0.0003164	841.66877	0.0320268	1196.5484	0.0005166
164.77748	0.0003874	486.90931	0.0011869	841.67503	0.0382848	1196.5511	0.0032472
165.08377	0.0194046	486.90949	0.0013713	841.86002	0.0157151	1196.5564	0.008551
165.17067	0.0004478	486.92502	0.0169017	841.93631	0.000588	1196.5613	0.0133818

165.90627	0.0120161	486.93002	0.0219017	841.94877	0.0130516	1196.5625	0.0146278
167.10011	0.0004198	486.93377	0.0256517	841.94877	0.0130516	1196.5688	0.0208778
167.53646	0.000428	486.93627	0.0281517	841.94877	0.0130516	1196.5738	0.0258778
168.11377	0.0246302	486.93752	0.0294017	841.95627	0.0205516	1196.5775	0.0296278
168.18877	0.0105111	487.58823	0.0002999	841.95877	0.0230516	1196.9263	0.0273349
168.34377	0.0156506	487.91483	0.0085408	841.96502	0.0293016	1197.066	0.0010546
169.05771	0.0003581	488.20911	0.0004096	841.97253	0.0368056	1197.1438	0.0326011
169.90678	0.0008435	488.20949	0.0007851	842.06707	0.0008324	1197.8878	0.0003874
170.26877	0.0145217	488.21013	0.0014261	842.2113	0.0009348	1197.8905	0.000168
170.35627	0.0113366	488.21067	0.001969	842.65924	0.0007952	1199.2	0.0168726
170.47552	0.0015616	488.22378	0.0150732	842.70211	0.0015619	1199.3625	0.0139384
171.16321	6.00E-05	488.23377	0.0250692	842.83663	0.0011062	1199.7439	0.0004013
171.31876	0.016144	488.24877	0.0400692	842.99628	0.0014219	1200	0.021263
171.77389	4.20E-05	488.28127	0.0725692	843.2734	4.20E-05	1200	0.0007015
172.72002	0.023999	488.8704	0.0009526	843.525	0.0003465	1200	0.0129887
173.23752	0.0112138	489.43545	0.0007177	843.66662	0.0004474	1200	0.0017636
174.05002	0.0092808	489.43558	0.0008451	843.69133	0.0002891	1200	0.0011763
174.0978	0.0010727	489.43559	0.0008566	844.47601	0.0009182	1200	0.011263
174.30377	0.0279326	489.43568	0.0009442	844.57502	0.0192094	1200	0.026267
174.39502	0.0084119	489.45002	0.0152897	844.67502	0.0147947	1200	0.0087219
174.45727	0.0010501	489.45127	0.0165397	845.13377	0.0106353	1200	0.0004453
174.61167	0.0003787	489.45127	0.0165397	845.33002	0.020641	1200	0.0172545
174.62877	0.0378927	489.46128	0.0265437	845.80439	0.002281	1200	0.010013
174.87037	0.001816	489.49805	0.0014463	845.81127	0.0091694	1200	0.0001964
175.01864	0.0001472	489.72189	0.000937	845.81752	0.0154194	1200	0.0326011
175.01878	0.0002864	489.73252	0.0235729	845.81752	0.0154194	1200	0.015013
175.01892	0.0004193	489.83877	0.0264049	845.82502	0.0229194	1200	0.0208778
175.01902	0.0005251	490.27502	0.177337	845.82752	0.0254194	1200	0.0127426
175.0211	0.0025991	491.11751	0.0239844	845.82752	0.0254194	1200	0.0011514
175.04127	0.0227775	491.56877	0.010827	845.83503	0.0329234	1200	0.0032472
175.04377	0.0252775	491.71049	0.0002264	846.17432	0.000476	1200	0.0146278
175.04877	0.0302775	492.06904	0.0003959	846.85811	0.0003232	1200	0.0005166
175.09189	0.0009504	492.08002	0.0113773	847.6327	6.00E-05	1200	0.0133818
175.76213	0.0006554	492.08002	0.0113773	847.89198	0.0002486	1200	0.0004013
176.58519	0.0003494	492.08627	0.0176273	848.17127	0.0226677	1200	0.0296278
176.5852	0.0003654	492.08752	0.0188773	848.50252	0.016205	1200	0.0002668
176.58545	0.0006123	492.09002	0.0213773	848.81502	0.0268684	1200	0.008551
176.58583	0.0009983	492.09627	0.0276273	849.76292	0.0006364	1200	0.0101037
176.59283	0.0079906	492.09627	0.0276273	851.17274	0.0006247	1200	0.0010546
176.60627	0.0214376	492.98127	0.0360695	851.18127	0.0091611	1200	0.0258778
176.61128	0.0264416	494.06877	0.010919	851.18377	0.0116611	1200	0.0230623
176.62252	0.0376876	494.38411	0.0003839	851.19627	0.0241611	1200	0.0003683
176.75202	0.0014821	495.6712	0.0002769	851.19752	0.0254111	1200	0.0127201
177.04174	0.0007299	496.00845	0.0005641	851.20252	0.0304111	1200	0.0355623
177.10766	0.0002047	496.34449	0.0007121	851.20627	0.0341611	1200	0.0105623
177.25869	0.0001138	496.72038	0.0064356	851.20627	0.0341611	1200	0.0280623
177.39502	0.0135201	496.80298	0.0002215	851.31928	4.20E-05	1200	0.0007812
177.62508	0.0003827	497.48127	0.0206689	851.3438	0.0008818	1200	0.0002661

177.63627	0.0115797	497.60986	4.20E-05	851.50341	0.0001526	1200	0.0422342
177.63752	0.0128297	498.73038	0.0011847	851.53345	0.001676	1200	0.0007855
177.64377	0.0190797	499.06377	0.0121267	851.67733	0.0004571	1200	0.0180623
177.64752	0.0228297	499.43907	0.0002277	851.85366	0.0002038	1200	0.0168726
177.65002	0.0253297	499.6505	0.0009105	852.31752	0.0278856	1200	0.0006219
177.65252	0.0278297	499.83718	0.0006582	852.79502	0.0267913	1200	0.0243123
177.66127	0.0365797	499.88279	0.0005686	853.13399	0.0048942	1200	0.0108023
177.88752	0.0150046	499.97377	0.0142605	853.40752	0.0123117	1200	0.0139384
177.93532	0.0012069	500.08364	0.0002588	853.94127	0.0145473	1200	0.0004227
178.23127	0.0140352	500.48189	0.0008912	853.94127	0.0145473	1200	0.0145396
178.58577	0.0011867	501.38522	0.0005062	853.94253	0.0158013	1200	0.0003874
178.58599	0.0014103	501.47847	4.20E-05	853.95002	0.0232973	869.59264	0.0012647
178.58663	0.0020474	501.769	0.0003041	853.95002	0.0232973	877.34247	0.000562
178.59502	0.0104437	502.97127	0.0118352	853.95252	0.0257973	879.95984	0.0002418
178.59627	0.0116937	503.08071	0.0001736	853.95252	0.0257973	882.26246	0.0003561
178.60002	0.0154437	503.27378	0.0017086	853.96502	0.0382973	906.56614	0.0002611
178.60627	0.0216937	503.44377	0.0205792	854.23505	0.0002799	910.83536	0.0013164
178.61128	0.0266977	503.72725	0.0002449	854.28252	0.0237491	917.22127	0.0149768
178.938	4.20E-05	503.77976	0.0007427	854.33794	0.0010149	927.48877	0.0137736
179.8108	0.0011151	504.16502	0.0111875	854.54633	4.20E-05	937.24947	0.0005465
180.51127	0.0132828	504.22564	0.0008769	854.74377	0.0155207	941.56379	0.0010374
180.75002	0.0141919	505.14082	0.0017186	855.12528	0.0004614	947.05252	0.0120946
180.89903	0.001146	505.16374	0.0002231	855.29252	0.0119191	949.20127	0.0314442
181.32108	0.0003608	505.86752	0.0144176	856.2485	0.0015405	952.38252	0.009611
181.33127	0.0216987	506.19627	0.0124335	856.87692	0.0014703	954.44341	0.0075651
181.39627	0.0216353	506.25286	0.005745	857.23627	0.0102073	958.87627	0.0151242
181.79377	0.0163834	506.31505	6.00E-05	857.34174	0.0015102	961.86317	4.20E-05
182.06252	0.0154161	506.81715	0.0006306	857.65126	4.20E-05	965.25088	0.0012855
182.21047	0.0059145	506.82752	0.0110019	858.60002	0.0152588	978.85377	0.0134948
182.26502	0.0220404	506.82752	0.0110019	859.28256	0.0001285	980.26995	0.0003446
182.82848	0.0009743	506.83003	0.0135059	859.87252	0.0155527	985.1353	0.0004388
182.8992	0.0005364	506.83752	0.0210019	860.06877	0.0184711	1000.7724	0.0014318
183.03895	0.000471	506.84127	0.0247519	860.29759	0.0013647	1007.8647	0.000772
183.04877	0.0102939	506.86502	0.0485019	860.63752	0.0287468	1010.0357	0.0002121
183.05502	0.0165439	507.06918	0.0003189	861.70252	0.0217377	1010.9589	0.0001994
183.05502	0.0165439	508.13377	0.0212395	861.78752	0.0150006	1014.5775	0.0227062
183.06252	0.0240439	508.47877	0.0275431	861.83273	0.0054101	1017.3075	0.0223988
183.06502	0.0265439	508.59502	0.0249129	864.02869	0.0007359	1029.075	0.0127184
183.06502	0.0265439	508.62739	0.0009894	864.05002	0.0136132	1036.6838	0.0131289
183.06502	0.0265439	508.63627	0.009871	865.12088	0.0002383	1041.3746	0.0002758
183.50627	0.0137303	508.64252	0.016121	865.3532	0.0003078	1051.5548	0.0004841
183.77377	0.0171511	508.64252	0.016121	865.58343	0.0004721	1060.706	0.0010344
183.83127	0.0234137	508.65252	0.026121	865.59377	0.0202151	1071.3776	0.0013411
184.02502	0.0224466	508.65252	0.026121	865.73127	0.0083387	1104.0691	0.0002708
184.12627	0.0105978	508.65252	0.026121	865.85252	0.0255928	1137.3088	0.0129399
184.30627	0.0157986	509.57394	0.0003677	866.46252	0.0145146	1154.8188	0.0413001
184.98821	0.0006613	509.57532	0.0003011	866.68663	8.61E-05	1173.731	0.0010985
184.99877	0.011221	509.86134	0.0006499	867.19909	0.0005358	1184.4475	0.0132872

185.00627	0.018721	509.95558	0.0002407	867.93752	0.0133396	1200	0.0132872
185.01252	0.024971	510.32752	0.0232731	868.01139	0.000672		
185.01877	0.031221	511.07632	0.001391	868.69345	0.0006587		
185.02127	0.033721	511.44329	0.0004018	869.10377	0.023717		
185.02877	0.041221	511.60127	0.0223489	869.30404	0.0004042		
185.02877	0.041221	511.63314	0.0014888	869.30511	0.0014711		
185.86295	0.0003359	512.21395	0.000785	869.30609	0.0024534		
185.9208	0.0002259	513.37056	0.0004139	869.30656	0.0001821		
186.04877	0.0273309	513.38325	0.0011929	869.31377	0.0101365		
186.31251	0.0149801	513.84127	0.0275491	869.31502	0.0113865		
186.64757	0.0002678	513.87996	0.0012935	869.31877	0.0151365		
186.64801	0.0007142	513.88752	0.008854	869.32502	0.0213865		
186.64838	0.0010854	513.88752	0.0156081	869.33003	0.0263905		
186.66252	0.0152267	513.90127	0.022604	869.44377	0.024331		
186.66752	0.0202267	513.90502	0.026354	869.60877	0.0113847		
186.66877	0.0214767	513.90752	0.028854	869.79003	0.0009369		
186.67127	0.0239767	513.91252	0.033854	869.88835	0.0014226		
186.67377	0.0264767	514.3163	6.00E-05	870.26808	0.0003988		
187.22171	4.20E-05	514.38931	8.46E-05	870.27727	0.0002694		
187.22201	0.000342	514.47502	0.0117029	870.28782	0.0014411		
187.22241	0.0007391	515.24459	6.83E-05	870.29627	0.009895		
187.23252	0.010852	515.24812	0.0002129	870.29627	0.009895		
187.23252	0.010852	515.35543	0.0009484	870.30002	0.013645		
187.23377	0.012102	515.53339	0.0002031	870.31002	0.023645		
187.23752	0.015852	516.39377	7.767371	870.31502	0.028645		
187.24878	0.027106	516.39379	2.515124	870.31877	0.032395		
187.33127	0.0103254	516.41752	0.0291067	870.32502	0.038645		
188.23127	0.0129411	516.46124	0.000165	870.40114	0.0009143		
188.93218	6.00E-05	517.69627	0.0221146	870.49377	0.0111936		
188.93861	0.0003637	518.63256	0.0011582	870.56252	0.011569		
189.43002	0.0257908	518.90006	0.0006778	871.49203	0.0002731		
190.5243	0.0006751	518.91377	0.0216382	871.72585	0.0004333		
190.60125	7.00E-05	519.13502	0.0228544	871.87217	0.0003167		
190.90623	0.0007674	519.33502	0.036798	871.91893	0.001837		
191.73127	0.0153638	519.63331	0.0006254	872.59867	0.0003888		
191.75351	0.0058492	519.63423	0.0015465	874.93952	0.0009239		
192.6483	0.0001617	519.63847	0.0057827	875.43002	0.0119186		
192.67502	0.0159372	519.64179	0.0091075	876.29002	0.0280021		
193.48044	0.0004438	519.64878	0.0160933	876.33495	0.0010781		
193.51063	0.000325	519.65877	0.0260893	876.33579	0.0019169		
194.4037	0.0010685	519.66127	0.0285893	876.34502	0.0111473		
194.62375	0.0002722	520.04904	0.0002435	876.34627	0.0123973		
194.62877	0.0383315	520.52075	0.0004028	876.34663	0.0127561		
195.55072	0.0005154	520.53127	0.0201825	876.35002	0.0161473		
195.55074	0.0005329	521.00352	0.001315	876.35127	0.0173973		
195.55601	0.0058089	521.02002	0.0234079	876.36127	0.0273973		
195.56252	0.0123206	521.47802	0.0010005	876.47539	0.0007557		
195.56753	0.0173246	522.62752	0.0252629	876.58516	0.0001109		

195.57377	0.0235706	523.18879	0.0004849	876.94377	0.0207171
195.57502	0.0248206	523.32877	0.0149828	877.36252	0.0094758
195.57752	0.0273206	523.80799	0.0007819	877.69002	0.0280447
195.80252	0.0247126	524.69515	0.0003908	877.98055	0.0015284
196.55259	0.0006184	526.25627	0.0113032	878.13655	0.0008388
196.76252	0.0207201	526.63934	9.05E-05	878.33813	0.0002119
197.77582	0.0001267	526.63964	0.0003945	878.63259	0.0004419
197.77607	0.000373	526.64082	0.0015747	878.81455	0.0005627
197.7762	0.0005041	526.64274	0.0034933	879.15115	0.0003103
197.77656	0.0008634	526.66128	0.0220306	879.21611	0.0002973
197.78326	0.0002352	526.66502	0.0257766	879.43343	0.0008472
197.78752	0.0118317	526.66752	0.0282766	879.69161	0.0003958
197.78877	0.0130817	526.72627	0.0003645	880.37752	0.0212878
197.78877	0.0130817	526.81116	0.0003764	880.39377	0.0144099
197.80503	0.0293357	528.22591	0.0002367	880.57002	0.0207996
198.20127	0.0207728	528.9178	0.0002208	880.62127	0.0242176
198.48348	0.000362	529.02627	0.011095	880.73963	0.0003499
198.48349	0.0003761	529.89831	0.0014911	881.2551	0.0017088
198.48394	0.0008263	530.94371	0.0030035	881.26252	0.0091348
198.48453	0.0014124	531.06502	0.0274524	881.26502	0.0116348
198.48642	0.0033054	532.24502	0.0214627	881.26502	0.0116348
198.50627	0.0231574	532.32896	0.0003794	881.27752	0.0241348
198.51002	0.0269074	532.40953	0.0010089	881.27877	0.0253848
198.51739	0.0003791	533.10672	0.0101148	881.28752	0.0341348
198.51744	0.0004287	533.36377	0.0146727	881.28752	0.0341348
198.51753	0.0344114	533.64148	0.0004311	881.66418	0.0011469
198.51777	0.000758	533.89813	0.0033046	882.65798	0.0001659
198.52752	0.0105099	534.38502	0.0160527	882.84326	6.00E-05
198.53127	0.0142599	534.97003	0.0006279	883.27027	0.0003955
198.53752	0.0205099	536.50788	0.0012148	883.83975	0.0002787
198.53877	0.0217599	536.74873	0.0005662	883.88251	0.0007314
198.55502	0.0380099	536.74903	0.0008677	885.58705	0.0011135
198.86837	6.00E-05	536.7505	0.0023377	885.58717	0.001238
198.88752	0.0227765	536.75752	0.0093579	885.58746	0.0015268
199.34627	0.0213881	536.75877	0.0106079	885.59502	0.0090915
199.82194	4.20E-05	536.76252	0.0143579	885.59627	0.0103415
200.79377	0.0093496	536.84377	0.0109372	885.60002	0.0140915
201.15266	4.20E-05	536.8782	0.000331	885.60627	0.0203415
201.15287	0.0002498	537.01995	0.0024925	885.61128	0.0253455
201.15371	0.0010859	537.03002	0.0125672	885.72502	0.0162144
201.16377	0.0111518	537.03002	0.0125672	885.81279	0.0001833
201.16502	0.0124018	537.03002	0.0125672	886.79155	0.0088437
201.16877	0.0161518	537.03752	0.0200672	886.81317	0.0016715
201.17002	0.0174018	537.04002	0.0225672	886.96877	0.0121304
201.18003	0.0274058	537.04627	0.0288172	886.99178	0.0009433
203.26877	0.0137329	537.05378	0.0363212	887.06635	0.0010751
203.35002	0.0114943	537.16456	0.000782	887.21621	0.0017999
203.37113	0.0032154	537.17377	0.0099964	887.39758	0.0005446

203.55909	0.0004072	537.18002	0.0162464	887.39761	0.0005726
203.55977	0.0010872	537.18002	0.0162464	887.39848	0.0014411
203.57378	0.0150986	537.18752	0.0237464	887.40877	0.011734
203.57387	0.0151896	537.18752	0.01502	887.41252	0.015484
203.57502	0.0163446	537.19002	0.0262464	887.41377	0.016734
203.58127	0.0225946	537.19002	0.0262464	887.41877	0.021734
203.58377	0.0250946	537.19002	0.0262464	887.42378	0.026738
203.58627	0.0275946	537.24752	0.0269538	888.24254	0.00082
204.04234	0.0010421	538.21752	0.0145057	888.59584	0.0004073
204.1698	0.0011957	538.64208	0.0002096	889.75251	0.0098186
204.23032	0.0001651	538.64232	0.0004476	890.22502	0.0151056
204.34002	0.0257922	538.64336	0.0014889	892.89877	0.0134868
204.57645	0.0003521	538.64344	0.0015672	892.9553	0.0003559
205.19002	0.0411566	538.65005	0.0081798	892.96877	0.0124492
205.31291	0.0003585	538.66627	0.0244012	893.78175	0.0012663
205.53147	0.0007769	539.24378	0.000796	893.99356	0.0008791
206.38782	0.0005314	539.68377	0.0249134	894.75663	0.0002522
206.89002	0.0228643	539.74752	0.0350928	895.22309	0.0013313
206.98081	0.0005542	540.21945	0.0003716	895.38638	0.0009016
207.18002	0.0277654	540.73752	0.0133815	895.39877	0.0132944
207.26215	0.2546187	541.24002	0.0280928	895.40002	0.0145444
207.54319	0.0003303	541.51957	0.0033819	895.40627	0.0207944
207.78208	0.0002869	542.077	0.0002487	895.40627	0.0207944
208.06502	0.0257545	542.196	0.0034313	895.41002	0.0245444
208.3345	0.0004285	543.02983	0.00042	895.41502	0.0295444
208.56438	0.0011807	545.17755	0.0019399	895.43002	0.0445444
208.64641	0.0003371	545.17985	0.0042393	895.97752	0.0306076
208.95877	0.0241008	545.18752	0.011909	896.93644	0.0003837
209.1653	0.0007255	545.18877	0.013159	897.3775	0.0019043
209.69377	0.0087444	545.19002	0.014409	897.38627	0.0106781
210.621	0.0005679	545.2595	0.0018135	897.38752	0.0119281
210.63127	0.0108427	546.21441	0.0003954	897.40002	0.0244281
210.63252	0.0120927	546.27483	0.0005226	897.40002	0.0244281
210.64627	0.0258427	546.30554	0.0018597	897.40377	0.0281781
210.64752	0.0270927	546.31252	0.0088473	897.40877	0.0331781
210.64877	0.0283427	546.32377	0.0133585	897.41003	0.0344321
210.65127	0.0308427	546.32502	0.0213473	897.43752	0.0147594
210.65628	0.0358467	546.32627	0.0225973	897.68127	0.0144567
211.01511	6.00E-05	546.32627	0.0225973	897.87642	0.0019724
211.01561	0.0005551	546.33002	0.0263473	898.18158	0.0002126
211.01627	0.0012196	546.33377	0.0300973	898.19252	0.0111559
211.02238	0.0073332	546.33753	0.0338513	898.19377	0.0124059
211.02272	0.0076663	546.50653	0.0005059	898.20627	0.0249059
211.03752	0.0224729	546.55939	0.0014486	898.20627	0.0249059
211.04127	0.0262229	546.84801	0.0008386	898.20877	0.0274059
211.04878	0.0337269	547.07502	0.012466	898.21002	0.0286559
212.61687	0.0009111	547.54563	0.0007825	898.21753	0.0361599
212.64752	0.013873	548.21377	0.0100053	902.39999	0.000945

213.66502	0.0148086	548.33752	0.016534	902.86716	0.0011545
214.32421	0.0003975	548.72252	0.0284044	903.35322	0.0005498
215.49311	0.0008302	549.17127	0.0253097	903.36502	0.0123499
215.62752	0.0229019	549.41377	0.0242368	903.36502	0.0123499
215.97908	0.0001341	550.31716	0.0005826	903.36753	0.0148539
216.29377	0.0122774	550.85712	0.0003062	903.37252	0.0198499
216.76508	0.0015145	551.08627	0.028524	903.37502	0.0223499
216.90485	0.0002663	553.70127	0.0254418	903.39377	0.0410999
216.91118	0.0066004	554.39377	0.0147626	903.39627	0.0435999
216.91377	0.0091929	556.20028	0.0001765	903.62799	0.0012731
216.91502	0.0104429	556.20877	0.0124415	903.78473	0.0005536
216.9154	0.0108199	556.25752	0.0166238	903.92906	0.0063835
216.91877	0.0141929	556.32244	0.0016268	903.98627	0.0237773
216.92502	0.0204429	557.17002	0.0204343	904.17252	0.0365147
216.93627	0.0316929	557.41796	0.0008082	904.49623	0.0002613
217.46751	0.0286001	557.43071	0.0011025	904.49695	0.0009747
217.58501	0.0366628	557.44252	0.0129197	904.50553	0.0095532
218.13919	0.0013348	557.44252	0.0129197	904.50752	0.0115515
218.14877	0.0109184	557.44252	0.0129197	904.50752	0.0115515
218.14877	0.0109184	557.45002	0.0204197	904.51128	0.0153036
218.15502	0.0171684	557.45252	0.0229197	904.51252	0.0165515
218.16252	0.0246684	557.45877	0.0291697	904.52378	0.0278055
218.16502	0.0271684	557.46628	0.0366737	905.11252	0.0140345
218.16502	0.0271684	557.60723	0.0003318	905.11377	0.0016868
218.17253	0.0346724	557.83877	0.0242172	905.1146	0.0025172
218.53502	0.0359868	558.11873	0.0011686	905.11644	0.004361
218.80753	0.0003625	558.11973	0.0021688	905.12378	0.011696
219.06623	0.0002998	558.12276	0.0051913	905.12502	0.012942
219.08752	0.0160122	558.12752	0.0099595	905.13127	0.019192
219.09352	0.0007178	558.13127	0.0137095	905.13627	0.024192
219.27502	0.0348138	558.13252	0.0149595	905.14002	0.027942
219.37993	0.0003576	560.38645	4.20E-05	905.39043	0.0002662
219.61191	0.000319	560.38798	0.0015774	905.68356	0.0003425
219.612	0.0004073	560.39474	0.0083358	905.71861	0.0003932
219.61208	0.0004912	560.39502	0.0086203	905.81287	0.0019619
219.62002	0.0084314	560.39627	0.0098703	905.89118	0.0003577
219.62002	0.0084314	560.40002	0.0136203	906.90369	0.0001996
219.62502	0.0134314	560.48164	0.0001816	906.9037	0.0002085
219.62753	0.0159394	561.71301	0.0016183	906.90562	0.0021231
219.63628	0.0246854	561.72377	0.0123784	906.91877	0.0152794
220.75752	0.0084442	561.72377	0.0123784	906.92377	0.0202794
220.85307	0.0002849	561.72377	0.0123784	906.93002	0.0265294
221.58173	0.0004039	561.73127	0.0198784	906.93127	0.0277794
221.68606	0.0005173	561.73377	0.0223784	906.94627	0.0427794
221.73127	0.0214042	561.74002	0.0286284	907.0846	0.0013714
221.99006	0.0004662	561.74002	0.0286284	907.15752	0.0104563
222.14877	0.0115125	562.15377	0.015906	907.69169	0.0003229
222.14907	0.0118098	563.45744	0.0007732	908.01988	0.0004752

222.15002	0.0127625	563.82002	0.0243173	908.03914	0.0003877
222.15627	0.0190125	564.02269	0.0002313	908.0394	0.0006469
222.15627	0.0190125	564.09377	0.0149018	908.03943	0.0006769
222.16002	0.0227625	564.20752	0.0262527	908.0401	0.0013473
222.17253	0.0352665	565.61565	0.0005009	908.04038	0.0016297
222.17752	0.0402625	565.93254	0.0003743	908.05628	0.0146446
222.20518	0.0002606	565.95002	0.0120061	908.06252	0.0237711
222.25502	0.0144636	566.11154	0.0010722	908.06627	0.0275211
222.63021	0.0070297	566.45622	0.0094593	908.06753	0.0287751
222.64502	0.0184299	566.46127	0.0145177	908.83752	0.0132696
222.79572	0.000391	566.46127	0.0145177	909.36359	0.0005375
223.34377	0.0207942	566.46127	0.0145177	909.4805	0.0013583
223.48761	0.0003608	566.46877	0.0220177	909.53157	0.0009217
224.05752	0.0080326	566.47127	0.0245177	909.95111	0.0002249
224.16502	0.0130563	566.47127	0.0245177	909.95159	0.0006979
224.35772	0.0001834	566.47877	0.0320177	909.9522	0.0013063
224.78377	0.0246513	566.74127	0.0444945	909.95265	0.0017605
225.44877	0.0153498	566.80559	0.0003237	909.95355	0.0026645
225.47286	9.97E-05	567.86877	0.011879	909.97502	0.0241344
225.59343	0.0001955	567.96314	0.0009681	909.97877	0.0278844
225.78377	0.0216255	568.00002	0.0145351	909.98003	0.0291384
225.79377	0.0130583	569.41252	0.0108157	910.58377	0.0242078
226.15877	0.014511	570.0537	0.0004143	910.79761	0.0002401
226.86752	0.0053975	570.64993	0.0005104	911.01083	0.0003374
227.22553	0.0004886	570.684	0.0008337	911.75601	0.0004009
227.22642	0.0013739	571.06752	0.0147858	912.10271	0.0003955
227.23752	0.0124793	571.52069	0.0009714	912.53763	0.0004781
227.24502	0.0199793	571.53002	0.0103047	913.28246	0.0023371
227.24627	0.0212293	571.53002	0.0103047	913.5495	0.0008663
227.25002	0.0249793	571.53627	0.0165547	913.78753	0.0034248
227.25503	0.0299833	571.54377	0.0240547	914.07191	4.20E-05
227.26135	0.0363028	571.54627	0.0265547	914.13349	0.0015912
227.87043	0.0006695	571.54627	0.0265547	914.24627	0.0271805
227.87752	0.0077613	571.55252	0.0328047	914.33641	0.0074421
227.88127	0.0115113	572.79774	0.0003238	914.66252	0.0245153
227.88377	0.0140113	572.95752	0.026264	914.86002	0.0138043
227.89627	0.0265113	573.58558	0.0002166	914.86002	0.0138043
227.89752	0.0277613	573.58574	0.0003756	914.86128	0.0150583
227.90627	0.0365113	573.58586	0.0004922	914.86877	0.0225543
227.90628	0.0365153	573.58595	0.0005896	914.87127	0.0250543
228.18913	0.009797	573.58725	0.0018837	914.87502	0.0288043
229.45252	0.0238864	573.61002	0.0246591	914.87752	0.0313043
229.76625	0.0007837	573.75428	0.0001977	914.88377	0.0375543
229.78002	0.0145532	573.75444	0.0003537	914.9063	0.0003753
229.78127	0.0158032	573.75537	0.0012877	915.59802	0.0007715
229.78655	0.0003398	573.7554	0.001319	915.68296	0.0001698
229.78752	0.0220532	573.76086	0.0067773	916.47443	0.0019081
229.79002	0.0245532	573.77877	0.0246887	916.48127	0.0087492



229.79127	0.0258032	576.78877	0.0106728	916.48877	0.0162492
229.79377	0.0283032	577.36426	0.0014341	916.49377	0.0212492
229.79877	0.0333032	577.37377	0.0109505	916.49502	0.0224992
229.94032	0.0018644	577.37502	0.0122005	916.49877	0.0262492
230.06801	0.0011628	577.38752	0.0247005	916.50877	0.0362492
230.23627	0.0168941	577.38752	0.0247005	916.51128	0.0387532
230.6335	0.0003043	577.39127	0.0284505	916.90627	0.013202
230.91049	0.0012329	577.39878	0.0359545	917.18752	0.0114295
231.26168	0.0002435	577.40252	0.0397005	917.55002	0.0096109
231.26189	0.0004564	577.79244	0.0004059	917.63127	0.0234335
231.26244	0.0010062	577.79363	0.0016022	919.07465	0.0011313
231.26263	0.0011928	577.79425	0.0022233	919.57145	0.0007129
231.266	0.0045646	577.80627	0.014243	919.61345	0.0001612
231.28127	0.0198406	577.81128	0.019247	921.81174	0.0002644
231.28502	0.0235906	577.81752	0.025493	922.21932	0.0007271
231.28628	0.0248446	577.82127	0.029243	922.33548	0.0005204
232.02667	0.0015587	578.07002	0.0120528	922.5549	0.0009502
232.03877	0.0136599	578.24846	0.0003521	923.42728	0.0010101
232.04502	0.0199099	578.57502	0.0150656	923.42782	0.0015534
232.05002	0.0249099	579.57002	0.025846	923.42794	0.0016637
232.06252	0.0374099	580.03752	0.0101402	923.43306	0.0067864
232.06752	0.0424099	580.13725	0.0008598	923.44878	0.0225064
232.26252	0.2374099	580.49752	0.0247884	923.45002	0.0237524
232.68127	0.0227267	580.59377	0.0163207	923.45252	0.0262524
233.04126	0.036442	580.71101	0.0009198	923.46127	0.0350024
233.339	0.0008388	581.54516	0.0005968	925.44127	0.0102925
233.47835	0.0009427	581.61252	0.0144911	925.45627	0.0108937
234.1632	5.00E-06	581.61877	0.0161853	925.60627	0.020818
234.38266	0.0009012	582.64907	0.0011542	925.63439	0.0011978
234.52769	0.0009759	582.87285	0.0007434	925.6749	0.0014805
235.33002	0.0136151	582.88627	0.0141633	926.02502	0.0107606
235.41627	0.0122401	582.88752	0.0154133	926.11818	0.0012469
235.98127	0.0237168	582.89377	0.0216633	926.22382	0.0008459
236.16877	0.0137473	582.89377	0.0216633	926.22383	0.0008626
236.17502	0.0155875	582.89627	0.0241633	926.22468	0.0017085
236.50377	0.0162302	582.89752	0.0254133	926.23377	0.0108023
236.50795	0.0003384	582.90377	0.0316633	926.23877	0.0158023
236.78127	0.0205306	583.04377	0.035301	926.24377	0.0208023
238.34367	0.0021665	583.3439	0.0003793	926.24377	0.0208023
238.35502	0.0135197	584.16252	0.0097756	926.24878	0.0258063
238.35627	0.0147697	584.80577	0.0074876	926.3428	0.0004351
238.36252	0.0210197	585.22502	0.0101356	926.41877	0.0151863
238.36252	0.0210197	585.47259	0.0037269	926.62946	0.0003897
238.36627	0.0247697	586.01752	0.0137947	926.82839	0.0003267
238.37127	0.0297697	586.98207	0.0008559	927.31252	0.0199509
238.38003	0.0385237	587.36358	0.0004945	927.37752	0.020932
238.39377	0.0154624	589.59502	0.0113508	928.12002	0.0130388
238.72337	0.001186	590.14377	0.0124989	928.75813	0.0002391

238.79422	0.0002489	590.98024	0.0002959	929.00028	0.0035997
238.91424	0.0016084	591.99972	0.000992	929.8817	0.0001841
238.98977	0.0010202	592.81322	0.000216	929.89929	0.0001904
239.13179	0.0007583	593.05357	2.30E-05	930.07573	0.0013826
239.19753	0.0011671	593.17824	70.571537	930.2314	0.0002379
239.57086	0.0009	593.17865	72.556315	930.76468	0.0011615
240.08627	0.0113629	593.18292	48.007305	930.79284	0.000143
240.41366	0.0004017	593.18321	56.138756	931.10298	0.0010166
241.33852	0.0012454	593.18323	59.709489	931.58127	0.028716
241.46252	0.012606	593.18472	45.871805	931.87752	0.0153344
241.73655	0.0002008	593.18476	35.722364	933.96997	0.0008132
241.85594	0.0001443	593.18744	49.843664	934.66572	0.0008337
242.48752	0.0135155	593.18746	48.993374	936.22251	0.0143499
243.09914	6.14E-05	593.19318	51.41927	936.82971	6.00E-05
243.15234	0.0002417	593.19537	34.658805	937.41318	0.0002086
243.18627	0.0113791	593.19559	60.513507	938.27127	0.0244534
243.24898	0.0003678	593.19663	24.740413	938.36697	0.0013847
243.71877	0.0117946	593.19663	50.916756	938.52124	0.0013744
243.8475	0.0003893	593.19783	24.043011	938.582	0.000381
243.93002	0.0283103	593.19865	63.990837	938.75877	0.0242612
244.02989	0.0004526	593.20003	34.117868	938.76753	0.0095608
244.10977	0.0099881	593.20324	8.8075983	938.77252	0.0145568
244.49252	0.0135842	593.20324	31.300412	938.77252	0.0145568
244.56252	0.0159461	593.20438	6.465014	938.77377	0.0158068
244.90857	0.0011369	593.20462	12.826362	938.78127	0.0233068
245.08179	8.31E-05	593.20627	10.594584	938.78127	0.0233068
245.36408	0.00136	593.20629	14.129685	938.79627	0.0383068
245.74877	0.016298	593.20633	21.614993	938.80252	0.0445568
245.93127	0.0150634	593.20633	11.60203	940.10252	0.0134975
246.15729	0.0015947	593.20672	48.752147	940.26377	0.0255617
246.51567	0.0094826	593.20752	48.031909	941.46811	0.000715
246.75002	0.0125127	593.20783	72.05973	941.85002	0.0223869
246.95127	0.0099152	593.2087	32.349922	941.97502	0.0129206
248.17787	0.0006277	593.20957	38.218789	942.19362	0.0001875
248.63851	0.0003326	593.20959	71.60158	942.7752	0.0004316
248.72877	0.0157079	593.20961	14.330566	943.19627	0.0207929
248.72877	0.0157079	593.20965	9.170701	943.23555	0.0074046
248.73003	0.0169619	593.21127	54.569401	943.23752	0.0093763
248.73752	0.0244579	593.21129	35.093729	943.24002	0.0118763
248.73752	0.0244579	593.21131	32.82491	943.24002	0.0118763
248.74002	0.0269579	593.21209	3.9907978	943.25252	0.0243763
248.74627	0.0332079	593.21213	16.1936	943.25377	0.0256263
248.75252	0.0394579	593.2122	33.150524	943.26252	0.0343763
249.4758	0.0002135	593.21224	66.741921	943.26252	0.0343763
249.47728	0.0016967	593.21224	0.7772574	943.85518	0.0003687
249.48752	0.0119366	593.21252	86.396002	943.87198	0.0005798
249.4928	0.0172104	593.21252	31.634376	943.93627	0.0271081
249.49878	0.0231906	593.21254	4.964759	944.40321	0.0002877

249.50002	0.0244366	593.21254	66.573297	945.18595	0.0003498
249.50252	0.0269366	593.21256	35.094999	945.71981	0.000667
249.50502	0.0294366	593.21326	5.9733579	945.73002	0.0108795
249.64377	0.0138465	593.21378	21.422674	945.73002	0.0108795
249.97877	0.028545	593.21445	51.719795	945.73627	0.0171295
250.44127	0.0109155	593.21752	48.041909	945.74627	0.0271295
250.44752	0.0171655	593.21754	19.632179	945.74627	0.0271295
250.44877	0.0184155	593.21756	56.469398	945.75002	0.0308795
250.45002	0.0196655	593.21758	19.463499	945.75378	0.0346335
250.45002	0.0196655	593.21877	56.470608	945.80752	0.0280055
250.45877	0.0284155	593.21879	73.586109	945.89377	0.0233825
250.45877	0.0284155	593.21882	42.457895	946.42502	0.0120175
250.46502	0.0346655	593.22502	19.639659	946.47633	0.0002607
251.18559	0.0002028	593.22504	15.433013	946.94694	0.0014892
251.19627	0.0108881	593.23127	54.589401	947.20031	0.001071
251.19877	0.0133881	593.23129	19.477209	947.38014	0.0003287
251.20252	0.0171381	593.23131	19.477229	947.41005	0.0009129
251.20627	0.0208881	593.23133	19.477249	947.66854	0.0002842
251.23377	0.0483881	593.23135	19.477269	948.18729	0.0034275
251.26877	0.0833881	593.23752	19.483439	948.90845	0.0010005
251.27879	0.0934001	593.37002	0.0252532	949.83752	0.0165452
251.76155	0.001209	593.53502	0.0279519	949.86174	0.0010396
251.92502	0.0140276	593.63752	0.0148983	949.93627	0.0269766
252.29093	0.0006754	593.66355	0.0004317	949.94899	0.0007848
252.4649	0.0016386	593.66399	0.0008741	949.96127	0.0130702
252.55002	0.0162602	593.66402	0.0009008	949.96127	0.0130702
252.55124	0.0002353	593.67502	0.0119067	949.96127	0.0130702
252.88377	0.0201911	593.67627	0.0131567	949.96877	0.0205702
252.89665	0.0008794	593.67627	0.0131567	949.97127	0.0230702
253.23459	0.0004393	593.67763	0.0145166	949.97752	0.0293202
253.30856	0.0014903	593.69127	0.010535	949.98503	0.0368242
253.4413	0.0003191	593.69253	0.0294107	950.26877	0.0162428
254.42952	0.0003158	594.62502	0.0115546	950.32329	0.0016655
254.57252	0.0119393	594.66856	0.0004439	951.12517	0.0003631
254.57252	0.0119393	596.22127	0.0245572	951.13627	0.0114636
254.58002	0.0194393	596.39377	0.0106075	951.13627	0.0114636
254.58127	0.0206893	597.7951	0.0009704	951.13627	0.0114636
254.58127	0.0206893	597.88127	0.0359362	951.14377	0.0189636
254.59002	0.0294393	598.04198	0.0012671	951.14627	0.0214636
254.59002	0.0294393	598.22377	0.012665	951.15252	0.0277136
254.59627	0.0356893	598.31243	0.0085301	951.15252	0.0277136
255.29769	0.0002416	598.31502	0.0111272	951.47579	0.0081876
255.56252	0.014087	598.31502	0.0111272	952.87813	0.0002996
255.68877	0.0110444	598.31753	0.0136312	952.944	0.0011822
255.74401	0.0014569	598.32502	0.0211272	953.54127	0.0364525
256.43376	0.0144362	598.32502	0.0211272	953.57527	0.0067003
256.95964	0.0008386	598.32877	0.0248772	953.5997	0.001315
257.34377	0.0156687	598.34627	0.0423772	953.86127	0.016595

257.44627	0.0277396	598.48627	0.0281394	954.00002	0.0231185
257.61466	0.0002782	599.88387	0.0003295	954.25627	0.0086477
258.41257	0.0002374	601.03924	0.0002942	955.08377	0.026842
258.60511	0.0003269	601.64872	0.0003076	955.18127	0.0114434
258.60531	0.0005236	601.89434	0.0002867	955.96252	0.0111639
258.61752	0.0127409	601.95052	0.0016985	956.19281	0.0016277
258.61877	0.0139909	601.95877	0.0099561	956.61911	0.0006721
258.61958	0.0147943	601.95877	0.0099561	956.98002	0.0105585
258.62502	0.0202409	601.96128	0.0124601	957.15002	0.0137689
258.63002	0.0252409	601.96877	0.0199561	957.54877	0.01366
258.63377	0.0289909	601.96877	0.0199561	957.82931	0.0039967
259.20502	0.0141899	601.97252	0.0237061	958.15002	0.0141793
259.25502	0.0122038	601.99627	0.0474561	958.25627	0.0200013
259.70483	0.0011121	602.49235	0.0077375	958.40663	0.0001336
259.81622	0.0014313	603.01252	0.013742	958.83226	0.0005524
259.94211	0.0014059	603.47257	4.20E-05	959.10252	0.0261888
259.95502	0.0143192	603.98127	0.0335911	959.37502	0.0223989
259.95502	0.0143192	604.05002	0.0105764	959.48425	0.0005698
259.96127	0.0205692	604.10252	0.0237711	959.95627	0.0113883
259.96252	0.0218192	604.13603	0.0002771	960.10627	0.0169015
259.96502	0.0243192	605.77826	0.000147	960.62411	0.0002581
259.96502	0.0243192	607.31551	0.0003092	960.68022	0.0003793
259.96502	0.0243192	607.40788	0.0003807	961.76103	0.0004697
260.57082	0.0004208	607.72192	0.0017972	962.29922	0.0004551
260.83502	0.0265301	608.08694	0.000806	962.2993	0.0005289
260.89377	0.0201118	608.08707	0.0009396	962.30036	0.0015895
261.38713	0.0024089	608.08917	0.0030403	962.30139	0.0026173
261.39377	0.0090489	608.09502	0.008892	962.31128	0.0125102
261.40252	0.0177989	608.09627	0.010142	962.32377	0.0250062
261.40252	0.0177989	608.10002	0.013892	962.32502	0.0262562
261.40877	0.0240489	608.10627	0.020142	962.32752	0.0287562
261.41002	0.0252989	608.11128	0.025146	963.33751	0.0126007
261.41877	0.0340489	608.36627	0.0131971	964.39502	0.0093997
261.41877	0.0340489	608.48502	0.0134833	965.26007	0.0010604
262.2756	0.0021196	608.72351	0.0013069	965.27377	0.0147618
262.28127	0.0077946	608.89864	0.0007485	965.27377	0.0147618
262.28377	0.0102946	609.01695	0.0005683	965.27377	0.0147618
262.28377	0.0102946	609.27252	0.0141078	965.28127	0.0222618
262.29752	0.0240446	609.27252	0.0141078	965.28377	0.0247618
262.30252	0.0290446	609.28003	0.0216118	965.28377	0.0247618
262.30627	0.0327946	609.28127	0.0228578	965.29127	0.0322618
262.31254	0.0390566	609.28377	0.0253578	966.36881	0.0009873
262.40345	0.0003454	609.28377	0.0253578	966.38002	0.0121987
262.59627	0.0120547	609.28752	0.0291078	966.38002	0.0121987
263.17877	0.0150172	609.30252	0.0441078	966.38002	0.0121987
263.82875	0.0010417	609.56627	0.0180015	966.38752	0.0196987
263.92377	0.0143869	609.88534	0.0013092	966.39627	0.0284487
263.98502	0.0147145	610.26522	0.0007722	966.39627	0.0284487

264.06877	0.0139373	610.39431	0.0002588	966.40378	0.0359527
264.83095	0.0003771	610.51227	0.0008985	966.57855	0.0003005
265.02365	0.0010139	611.13127	0.0236406	966.59039	0.0011023
265.61177	0.0001026	611.29382	6.42E-05	966.92079	0.0021704
266.16903	0.0016095	611.41252	0.0149064	967.62391	0.0013626
266.26252	0.0143462	611.44063	0.0086817	967.93752	0.0144891
266.40627	0.0142104	611.44252	0.0105747	968.59377	0.0161579
266.58048	0.0010149	611.44877	0.0168247	968.6129	0.0004643
267.64002	0.0208467	611.44877	0.0168247	969.71252	0.0154595
267.79126	0.0121626	611.45627	0.0243247	970.32081	0.0011106
267.86877	0.0116088	611.45877	0.0268247	970.74656	0.0002938
267.90056	0.0002898	611.45877	0.0268247	971.26252	0.0228488
268.12509	0.0001513	611.46628	0.0343287	971.79002	0.0147159
268.25732	0.0012955	611.99104	0.0002324	973.32302	0.0002626
268.66877	0.0130003	612.78852	0.000842	973.67771	0.0011218
268.90378	0.0002476	612.97752	0.0235384	973.83627	0.0129506
269.08502	0.0115251	613.24692	0.000616	974.16877	0.0099279
269.08502	0.0115251	613.24755	0.0012547	974.59615	0.0009826
269.08627	0.0127751	613.24771	0.0014069	974.63383	0.0006087
269.09252	0.0190251	613.25752	0.0112245	975.04627	0.0138306
269.09377	0.0202751	613.25877	0.0124745	975.27127	0.0291445
269.10877	0.0352751	613.26252	0.0162245	975.32249	0.0002685
269.11502	0.0415251	613.26877	0.0224745	975.61034	0.000153
269.28127	0.2077751	613.27378	0.0274785	976.54127	0.0319951
269.81477	0.0002994	613.54872	0.0004435	976.8281	0.0003714
269.84252	0.017367	613.76273	0.0072174	977.57963	0.0016065
270.0896	0.0002345	614.19164	0.0003165	977.74201	0.0006814
270.49762	0.000874	614.98127	0.0128649	977.97502	0.0192094
270.90137	0.0011329	615.0698	0.0001396	978.02771	0.000513
271.25533	0.0010972	615.2141	0.000405	978.16974	0.0016655
271.26252	0.0082918	615.45002	0.012212	978.18002	0.0119543
271.26502	0.0107918	615.65917	0.0005362	978.18127	0.0132043
271.27127	0.0170418	615.91877	0.0098406	978.18752	0.0194543
271.27877	0.0245418	615.95252	0.0235298	978.18752	0.0194543
271.28377	0.0295418	616.25928	0.000411	978.19127	0.0232043
271.28752	0.0332918	616.70217	0.0015758	978.20252	0.0344543
271.29377	0.0395418	616.70218	0.0015842	978.20503	0.0369583
271.40502	0.0176226	616.70331	0.0027157	978.33341	0.0009973
271.84982	0.0002687	616.71252	0.0119325	978.66121	0.0002437
272.01224	0.0005615	616.71502	0.0144325	978.72799	0.0001965
272.67533	0.0004699	616.72002	0.0194325	979.45252	0.020871
272.95759	0.0012106	616.72502	0.0244325	980.21489	0.000353
273.30007	0.0001799	616.73627	0.0356825	980.92377	0.0154495
273.3002	0.0003074	616.76236	0.0015179	981.51249	0.0013011
273.30111	0.001215	617.03015	0.0006775	981.61744	0.000368
273.30166	0.0017739	617.44501	0.0017252	981.73752	0.0185646
273.31127	0.0113838	617.5347	0.000334	983.40227	0.0016135
273.31877	0.0188838	617.86252	0.0119098	983.45627	0.0370056

273.32752	0.0276338	617.86941	0.0015459	983.54002	0.0228708
273.33002	0.0301338	618.16315	0.000549	983.56627	0.0135348
273.48213	0.0003947	618.85002	0.015159	984.01626	4.20E-05
274.59914	0.0002905	619.15659	0.0011781	984.01718	0.0009553
276.50627	0.0162002	619.89974	0.0002528	984.02627	0.0100522
276.55485	0.0004429	619.98073	0.0007571	984.02627	0.0100522
276.67998	0.0003484	619.98127	0.0116083	984.02628	0.0100568
276.68003	0.0003933	620.174	0.0002043	984.02752	0.0113022
276.68074	0.0011088	621.00752	0.0075969	984.03127	0.0150522
276.68337	0.0037336	621.01444	8.76E-05	984.04877	0.0325522
276.68877	0.009141	621.29277	0.0001616	984.12502	0.0135841
276.69377	0.014141	621.45653	0.0007025	984.29377	0.0198944
276.70127	0.021641	622.01541	0.000289	984.65734	0.0033168
276.70503	0.025395	622.52537	0.0032012	984.69377	0.0128295
276.8202	0.0008367	622.53627	0.0141008	985.26128	0.0089616
276.83002	0.0106605	622.53752	0.0153508	985.26627	0.0139576
276.83127	0.0119105	622.54377	0.0216008	985.26752	0.0152076
276.84377	0.0244105	622.54377	0.0216008	985.27252	0.0202076
276.84377	0.0244105	622.54627	0.0241008	985.27502	0.0227076
276.84627	0.0269105	622.54752	0.0253508	985.27502	0.0227076
276.84752	0.0281605	622.55502	0.0328508	985.29002	0.0377076
276.85379	0.0344225	623.95921	0.0003513	985.29002	0.0377076
277.27252	0.0348973	624.52229	0.0009403	985.63503	0.0007273
277.27502	0.2084479	625.40627	0.0347834	985.73752	0.0141384
278.14002	0.0144647	625.4134	0.0018112	986.6724	0.0006065
278.64756	0.0001012	625.51629	0.0001254	988.02172	0.005165
278.69252	0.0261401	625.81502	0.0231542	988.27384	0.0003956
279.08927	0.0009493	625.83627	0.0144395	988.51396	0.0110145
279.15845	0.0004988	626.12386	0.0009289	989.02346	0.0002102
279.16877	0.0108271	626.34627	0.0100837	989.13332	0.0003983
279.17752	0.0195771	626.63211	0.0005497	989.18072	0.0011205
279.17752	0.0195771	626.90318	0.0003977	990.80511	0.0001928
279.18502	0.0270771	627.07752	0.0239379	991.25368	0.0001319
279.19002	0.0320771	627.246	4.20E-05	991.85174	0.001651
279.19377	0.0358271	628.25257	0.0005315	991.90002	0.0151156
279.19377	0.0358271	628.60627	0.0129415	991.9673	0.0009838
279.27886	0.00039	628.97686	0.0002862	993.12417	0.0008061
280.18974	0.0002865	628.98877	0.0236265	993.19193	0.0003763
280.26116	0.1271066	629.03571	0.0002116	993.63252	0.011867
280.32252	0.0150718	630.50732	0.0006624	993.88212	0.000243
280.44127	0.0002778	630.51502	0.0083627	993.89002	0.0229406
280.5879	0.000714	630.52127	0.0146127	993.97252	0.0123426
280.76502	0.0114397	630.52502	0.0183627	994.09536	0.0002469
281.08252	0.0186899	630.53377	0.0271127	994.26127	0.0165894
281.26877	0.0160329	630.53502	0.0283627	994.50261	0.000113
281.66047	0.0003177	630.54377	0.0371127	994.95737	0.0010112
281.67127	0.0111257	631.04135	0.000739	995.51002	0.0400518
281.67127	0.0111257	631.22752	0.0255575	996.31632	0.00033

281.68003	0.0198797	631.64984	0.0011697	996.48366	0.0038667
281.68127	0.0211257	632.52919	0.0010973	996.66001	0.0001789
281.68127	0.0211257	632.89447	0.0001134	996.68498	0.0004595
281.68502	0.0248757	632.99627	0.024028	996.72517	0.0003611
281.70252	0.0423757	633.22589	0.0002307	997.40406	0.0086909
281.81179	0.0003051	633.80252	0.0123243	998.71502	0.0245038
281.92877	0.0121099	634.38994	0.000309	998.74377	0.0113264
282.10492	0.0024833	634.61638	0.0004903	998.75877	0.0140384
282.11252	0.0100848	634.99673	0.001558	999.08044	4.20E-05
282.11502	0.0125848	635.31447	0.001603	999.08706	0.0006589
282.12752	0.0250848	635.70502	0.0259608	999.08735	0.0009539
282.12752	0.0250848	635.97502	0.0131992	999.08861	0.002213
282.12877	0.0263348	635.99252	0.0143724	999.09502	0.0086263
282.13752	0.0350848	636.13503	0.0003788	999.10002	0.0136263
282.13752	0.0350848	636.40627	0.0121992	999.10252	0.0161263
283.38501	0.013057	636.8377	0.0001861	999.11127	0.0248763
283.39752	0.0113191	637.19878	0.0096256	999.11252	0.0261263
283.65686	0.0003274	637.20377	0.0146216	999.14385	0.0002484
284.63377	0.0360227	637.20502	0.0158716	1000.0932	0.0005861
284.72154	0.0012957	637.21002	0.0208716	1000.15	0.0216139
284.92877	0.0111047	637.21252	0.0233716	1000.1708	0.00063
284.92877	0.0111047	637.22752	0.0383716	1000.3275	0.0254224
284.93002	0.0123547	637.22752	0.0383716	1000.8369	0.001248
284.93627	0.0186047	637.23127	0.0421216	1000.9757	0.000353
284.93752	0.0198547	638.08757	0.0003001	1001.0938	0.0126223
284.93752	0.0198547	638.31744	0.0005953	1001.1056	0.0004987
284.95252	0.0348547	638.42897	0.0009367	1001.1063	0.0011363
284.95877	0.0411047	638.48752	0.0102066	1001.1065	0.0013159
285.59377	0.014697	639.2236	0.0052551	1001.1138	0.0086303
286.49185	0.0008711	639.23002	0.0116831	1001.115	0.0098803
286.77252	0.0228335	639.23127	0.0129331	1001.1188	0.0136303
286.80325	0.0003216	639.23752	0.0191831	1001.125	0.0198803
287.56002	0.0111317	639.23752	0.0191831	1001.13	0.0248843
287.58874	0.0007934	639.24127	0.0229331	1001.5898	0.0004477
287.58887	0.0009152	639.24627	0.0279331	1001.9409	0.0009113
287.58926	0.0013123	639.25378	0.0354371	1002.045	0.0215205
287.59888	0.0109298	640.56375	0.0001948	1002.0666	0.0005271
287.60503	0.0170775	640.60749	0.0007172	1002.4919	0.000277
287.61252	0.0245735	640.6075	0.0007251	1002.5161	0.0002349
287.61502	0.0270735	640.60773	0.000954	1002.5813	0.0110288
287.62377	0.0358235	640.60794	0.0011645	1003.4313	0.0134606
287.84002	0.0214573	640.61015	0.0033743	1003.7239	0.0003967
288.60313	0.0010448	640.63127	0.0245027	1003.9471	0.0004139
288.96324	0.0003175	640.63502	0.0282527	1005.8315	0.0002777
289.04404	0.000122	640.63628	0.0295067	1005.9616	0.0003434
289.30898	0.0003393	640.97946	0.0002034	1006.0769	0.000349
290.41877	0.0144664	641.03627	0.0141347	1006.2388	0.0258011
290.7567	0.0002591	641.27877	0.0116521	1006.725	0.012435

291.39789	0.0002466	641.7971	0.0010901	1006.8936	0.0001238
291.84088	0.0011176	641.80502	0.0090147	1007.3169	0.0003994
291.85935	0.0014338	641.81127	0.0152647	1008.2564	0.0001482
292.15627	0.0122158	641.81127	0.0152647	1008.8659	0.0002754
292.62502	0.0162282	641.81877	0.0227647	1008.8659	0.0003195
293.10716	0.0012751	641.82127	0.0252647	1008.874	0.0083593
293.52093	0.0043786	641.82127	0.0252647	1008.8763	0.0106714
293.81877	0.0199968	641.82127	0.0252647	1008.8763	0.0106714
293.89163	0.0012451	641.84223	0.0018101	1008.8775	0.0119214
294.96677	0.0003348	642.02764	0.0008726	1008.8813	0.0156714
294.97752	0.0110899	642.11502	0.0142072	1008.8925	0.0269254
294.97752	0.0110899	642.11877	0.0186713	1009.0528	0.0003228
294.98003	0.0135939	642.26252	0.0151663	1009.0578	0.0004856
294.98752	0.0210899	642.42502	0.0244557	1009.5174	4.20E-05
294.98752	0.0210899	642.75677	0.0002246	1010.5298	0.0009234
294.99127	0.0248399	643.08118	0.0008836	1010.54	0.0111015
295.00877	0.0423399	645.44377	0.0163912	1010.5438	0.0148515
295.09259	0.0059696	645.49821	0.0003655	1010.5463	0.0173515
295.57502	0.0195043	645.72748	0.0006697	1010.5538	0.0248515
296.0889	0.000353	645.97338	0.0001118	1010.5588	0.0298515
296.11877	0.0117974	646.10203	0.000528	1010.5625	0.0336015
296.5505	0.0018421	646.10246	0.0009548	1010.5688	0.0398515
298.55081	0.0011884	646.10271	0.0012067	1010.6688	0.0125989
298.80377	0.0156379	646.11502	0.0135228	1010.8634	0.0002652
299.32002	0.2051413	646.11877	0.0172728	1011.1668	0.00053
300.02127	0.0260446	646.12627	0.0247728	1011.3375	0.0220439
300.1772	0.0067278	646.13003	0.0285268	1011.3596	0.000257
300.78377	0.03212	646.13127	0.0297728	1011.6629	0.0009967
300.82502	0.0090904	647.11627	0.0215245	1012.1003	0.00761
301.08877	0.0094649	647.26252	0.0153121	1012.2688	0.0119902
301.15127	0.0152765	647.74877	0.0316356	1012.9592	0.0003198
301.33676	0.0015315	648.45219	0.001962	1013.1602	0.0060342
301.8986	0.0010762	648.55561	0.0003777	1013.3941	0.0023568
301.98591	0.000652	649.31083	0.0001689	1013.4421	0.0004246
302.50877	0.0207518	649.44601	0.0009535	1014.3988	0.0292105
302.79922	0.0014675	649.54012	0.0001983	1014.5875	0.0097892
302.8475	0.0022283	649.90218	0.0004147	1015.1325	0.0216845
302.85502	0.0097498	649.91127	0.0095107	1015.1481	0.0041816
302.86252	0.0172498	649.91877	0.0170107	1015.6598	0.0002869
302.86877	0.0234998	649.92502	0.0232607	1015.8388	0.0245839
302.86877	0.0234998	649.92502	0.0232607	1016.4018	0.0004811
302.87127	0.0259998	649.92752	0.0257607	1016.4024	0.0011307
302.87252	0.0272498	649.92877	0.0270107	1016.4024	0.0011331
302.88003	0.0347538	649.93628	0.0345147	1016.407	0.0056949
303.23109	0.0002859	650.96877	0.0126694	1016.4238	0.0224697
303.37185	0.0002871	651.44977	0.0001066	1016.425	0.0237197
303.49452	0.0008761	651.45051	0.0008429	1016.4275	0.0262197
303.54187	0.0002064	651.45093	0.0012644	1016.43	0.0287197



303.56752	0.0159454	651.45752	0.0078613	1016.895	0.0244696
303.66252	0.0127758	651.45752	0.0078613	1016.9024	0.0008917
303.76877	0.0120904	651.46252	0.0128613	1017.2235	0.0007986
304.99878	0.0101408	651.46502	0.0153613	1017.2313	0.0086061
305.00377	0.0151328	651.47378	0.0241153	1017.245	0.0223561
305.00502	0.0163828	651.49377	0.0148491	1017.245	0.0223561
305.01252	0.0238828	651.53827	0.0010398	1017.2475	0.0248561
305.01252	0.0238828	652.48235	0.0002846	1017.2488	0.0261061
305.01627	0.0276328	652.81263	0.000207	1017.2525	0.0298561
305.02752	0.0388828	652.85252	0.0309179	1017.2625	0.0398601
305.04377	0.0337364	653.15837	0.0001918	1017.2702	0.0002883
305.07127	0.0826328	653.92834	0.0012161	1017.2706	0.0007465
305.29754	0.0003751	654.24708	0.0002037	1017.2782	0.0012258
305.29756	0.0003938	654.76498	0.0009498	1017.2813	0.0113979
305.29761	0.0004437	655.71181	0.0009581	1017.2825	0.0126479
305.29819	0.0010235	656.43391	0.0031565	1017.2827	0.012865
305.29895	0.0017845	656.46425	6.00E-05	1017.2838	0.0138979
305.31877	0.0216056	656.98002	0.0168335	1017.2938	0.0238979
305.32252	0.0253556	657.1907	0.0012948	1017.2988	0.0289019
305.32378	0.0266096	657.38933	0.0008939	1017.4701	0.0010779
305.67372	0.000236	658.02403	0.0005147	1017.675	0.0141139
305.67389	0.0004144	658.06377	0.0082908	1017.895	0.0083933
305.67398	0.0004998	658.47127	0.0114499	1018.8156	0.0003745
305.67469	0.0012154	658.51002	0.0224789	1019.067	0.0016394
305.68373	0.010253	658.63252	0.0210825	1019.8309	0.0004347
305.69377	0.0202948	660.01944	0.0007992	1019.8425	0.0120786
305.69752	0.0240448	660.10002	0.0117982	1019.8438	0.0133286
305.69878	0.0252988	660.23127	0.0118106	1019.85	0.0195786
305.88877	0.0005082	660.40877	0.02171	1019.85	0.0195786
306.94252	0.026303	660.44452	0.0006023	1019.8538	0.0233286
307.04547	0.0100913	660.49233	0.0001514	1019.8588	0.0283286
307.32377	0.106017	661.26192	0.0003047	1019.8663	0.0358326
308.4873	0.0001791	661.55001	0.0124465	1020.0357	0.0004135
309.56752	0.0327759	662.52752	0.0249017	1020.1533	0.0001855
309.88415	0.0003174	662.57347	0.0003635	1020.1536	0.0005108
309.88418	0.0003518	662.78208	0.0005249	1020.1539	0.0008445
309.88435	0.0005255	662.78492	0.0002244	1020.1542	0.0011372
309.88619	0.0023615	663.46617	0.0003044	1020.1638	0.0106824
309.89878	0.0149492	664.0172	0.0004701	1020.1688	0.0156824
309.90569	0.0004877	664.02502	0.0082984	1020.17	0.0169324
309.90627	0.0224452	664.02627	0.0095484	1020.18	0.0269364
309.90877	0.0249452	664.04252	0.0257984	1020.675	0.0105884
309.91752	0.0336952	664.04377	0.0270484	1020.8906	0.0001361
310.86505	4.20E-05	664.04502	0.0282984	1022.0128	0.001397
311.09377	0.0133599	664.04627	0.0295484	1022.6813	0.0119765
311.23932	0.0009952	664.06877	0.0520484	1023.6715	0.0025096
311.23946	0.001134	664.11377	0.0202727	1023.6813	0.0122418
311.25002	0.0116945	665.74857	0.0004888	1023.6838	0.0147418

311.25127	0.0129445	666.52127	0.0207157	1023.6838	0.0147418
311.25253	0.0142025	667.01207	0.0002781	1023.6963	0.0272418
311.26132	0.0229867	667.30627	0.0365714	1023.7063	0.0372418
311.27002	0.0316945	667.41752	0.0407694	1023.7063	0.0372418
311.28628	0.0479485	667.59377	0.0159932	1023.71	0.0409918
311.30002	0.0140825	668.89332	0.0005729	1023.9575	0.0241958
311.84607	0.0003824	668.89566	0.0009474	1024.1456	6.08E-05
314.15232	0.0016239	669.94877	0.0242111	1024.1588	0.0132233
314.16252	0.0118294	670.62646	0.0006808	1024.1588	0.0132233
314.16752	0.0168294	670.81752	0.0264991	1024.1663	0.0207233
314.17502	0.0243294	670.87296	0.0003299	1024.1675	0.0219733
314.17502	0.0243294	671.33911	0.001118	1024.1688	0.0232233
314.17752	0.0268294	671.50877	0.0244515	1024.1688	0.0232233
314.17877	0.0280794	671.51792	0.0007602	1024.1838	0.0382233
314.18503	0.0343334	671.85452	0.0007881	1024.3606	0.0012588
314.26133	0.0548051	671.86502	0.0112878	1024.8025	0.0150555
314.42822	0.009744	671.86877	0.0150378	1024.8813	0.0145937
314.96725	0.0009384	671.87127	0.0175378	1025.507	0.0005294
314.98002	0.0137078	671.87752	0.0237878	1026.075	0.0196407
314.98002	0.0137078	671.87877	0.0250378	1026.64	0.0002899

## APPENDIX J. RUN TWO TEST DATA

Each time point in the chart represents a message. This simulation consisted of a full-scale network and CID information requirements.

<u>TIME</u>	<u>DELAY</u>	<u>TIME</u>	<u>DELAY</u>	<u>TIME</u>	<u>DELAY</u>
7.341274	0.023676927	1136.424	0.000348	880.0201	0.020112
10.212524	0.024799659	1137.195	0.025056	905.6833	8.80E-05
23.341274	0.025074199	1140.02	0.020052	908.0196	0.000186
30.537524	0.020654495	1158.745	0.000377	912.5389	0.001708
33.400024	0.028561595	1160.02	0.020024	920.0201	0.020068
39.860024	0.027196374	1162.733	0.000506	926.117	4.20E-05
50.468774	0.024202355	1172.705	0.001627	933.9706	0.001418
51.500024	0.019813794	1180.014	0.013806	940.0201	0.020048
71.475024	0.024344714	1197.891	0.001077	960.0264	0.026346
74.356274	0.030466267	1199.744	0.000122	974.6345	0.001258
77.231274	0.023861035	0.02129	0.02129	976.535	0.025745
81.347524	0.026249951	8.448774	0.02385	980.0201	0.020068
96.112524	0.031099588	22.76127	0.024732	993.8963	0.029191
110.73752	0.019120011	24.42627	0.011819	999.0808	0.000396
120.54377	0.022663716	32.52507	0.000203	1000.02	0.020044
121.41877	0.023158036	40.02127	0.021274	1006.725	0.012435
123.01252	0.03006158	44.93002	0.027164	1012.093	0.000293
133.49377	0.022112694	48.17752	0.010874	1020.026	0.026322
143.54377	0.022017462	60.03377	0.033774	1026.641	0.001281
146.69752	0.026576488	70.35252	0.036026	1028.321	0.000325
176.60627	0.021437603	78.54627	0.010144	1030.693	0.001587
177.65002	0.025329743	80.02128	0.021282	1034.222	0.001534
186.66877	0.021476741	82.90127	0.007977	1034.45	0.012745
187.22188	0.000207299	92.28127	0.036675	1040.014	0.013838
195.58127	0.031070616	100.0213	0.021302	1045.709	0.000739
198.50627	0.023157413	100.1528	0.000374	1053.388	0.012992
198.53752	0.020509884	108.0413	0.025259	1059.923	0.027374
229.78752	0.022053167	113.9525	0.011345	1060.014	0.013842
238.36252	0.021019669	120.0275	0.027528	1071.971	0.00093
258.62502	0.02024088	127.85	0.034263	1080.02	0.020068
261.41002	0.025298856	135.3089	0.000531	1093.066	0.024529
269.09377	0.020275121	139.331	0.001333	1100.026	0.026274
271.27877	0.024541791	140.0213	0.021274	1100.026	0.026294
276.67979	0.000153054	160.0213	0.021294	1100.026	0.026314
294.99377	0.027339938	161.0763	0.010486	1120.014	0.013854
314.17502	0.024329377	180.0213	0.021298	1122.047	0.000268
314.98752	0.021207841	183.065	0.026544	1122.499	0.006976
319.26627	0.024848813	200.0213	0.021278	1140.02	0.020048
321.44127	0.026005993	203.559	0.000272	1146.247	0.000379
328.30627	0.024740664	211.0162	0.001095	1147.597	0.000338

340.99377	0.020529973	216.915	0.010443	1153.438	0.012771
354.23752	0.019706798	218.165	0.027168	1160.014	0.013862
385.00002	0.027170261	220.0213	0.021278	1170.584	0.000681
395.52877	0.022676787	220.0213	0.021298	1173.611	6.00E-05
399.17427	0.000276055	227.24	0.014979	1188.259	0.000468
412.57877	0.028213649	227.9063	0.036511	1193.293	0.000954
414.62252	0.024386767	231.2621	0.000657	1195.2	0.000467
425.15627	0.023234566	240.0213	0.021294	0.020056	0.020056
437.18127	0.024837878	250.465	0.034665	12.64988	0.001149
441.04752	0.027623062	251.1859	0.000491	20.02008	0.020084
456.64752	0.027203092	260.015	0.015028	23.60627	0.012878
464.80002	0.030340173	262.3063	0.032795	36.63127	0.013606
466.47022	0.000169376	280.0088	0.008794	40.02013	0.020132
516.41002	2.531354	282.1375	0.035085	60.02637	0.026366
537.03752	0.020067223	284.9588	0.041105	67.67627	0.010199
557.45002	0.020419655	293.23	61.20491	80.02006	0.020064
593.20002	19.614659	300.015	0.015032	86.77913	0.000597
593.20008	56.451918	305.0275	0.038883	90.60627	0.016404
593.20627	19.452189	309.8841	0.000293	100.0263	0.026294
601.96877	0.019956064	320.0088	0.008794	100.0263	0.026314
609.28127	0.022857817	326.0529	0.000246	114.0475	0.00026
613.26877	0.022474461	340.0213	0.021274	135.1472	0.000233
616.72502	0.024432545	340.0213	0.021294	140.0139	0.013858
664.04127	0.02454836	340.0213	0.021314	146.9138	0.009206
671.87877	0.02503784	340.0213	0.021334	155.5135	0.000744
675.18752	0.023331949	340.0214	0.021354	157.2457	0.001396
692.60002	0.021026815	340.0214	0.021374	160.0263	0.026274
700.96627	0.026194109	340.0214	0.021394	170.2688	0.014522
712.84377	0.02337816	340.0214	0.021414	180.0201	0.02011
715.40627	0.022549926	340.0214	0.021434	187.3438	0.022825
727.13752	0.02023068	341.1838	0.01152	200.0139	0.013862
746.95002	0.042699586	347.4188	0.034513	203.3682	0.000319
747.30627	0.020721228	352.3775	0.030067	204.34	0.025792
747.97252	0.029694801	360.0088	0.008794	207.7826	0.0008
778.63885	0.000832462	361.8271	0.001334	293.231	67.45031
780.76877	0.01888595	366.3356	9.79E-05	293.2344	33.23435
790.41877	0.022612081	380.015	0.015044	293.2345	24.97845
795.94377	0.021321774	382.0263	0.010902	293.2356	63.29718
797.69377	0.028588777	385.8438	0.031583	293.2381	68.88058
804.56877	0.020175446	400.0088	0.008778	293.2381	30.83503
809.36252	0.02252582	405.6963	0.022822	293.2394	47.87671
813.47502	0.021653733	415.0338	0.021983	293.2395	73.23945
819.11877	0.024606398	420.0088	0.008774	293.2395	53.23947
820.36257	0.000490671	421.7775	0.028989	293.2452	13.24519
820.44377	0.021550216	426.4725	0.027119	299.1263	0.011391
820.46877	0.019569057	427.1247	0.001351	303.7688	0.01209
826.23752	0.020972499	440.015	0.015028	307.0356	0.000195
869.32502	0.021386548	455.4638	0.008848	311.3063	0.020333

881.27877	0.02538483	455.8775	0.02348	320.0201	0.020108
887.41877	0.021733975	457.6312	0.00042	334.6782	0.000227
923.45002	0.023752449	460.0213	0.021302	340.0201	0.020108
926.24377	0.02080227	461.7475	0.023626	356.5176	0.00034
965.28127	0.022261841	480.0088	0.008798	358.55	0.016511
984.01642	0.000194269	489.445	0.01029	360.0326	0.032576
985.27502	0.022707565	492.09	0.021377	380.0201	0.020132
1008.8657	6.00E-05	500.015	0.015028	382.8295	0.000107
1010.5538	0.02485146	508.6525	0.026121	389.2588	0.027493
1017.2938	0.023897869	520.0213	0.021306	393.6188	0.015674
1020.1534	0.000263412	520.0213	0.021326	400.0201	0.020112
1024.1688	0.023223261	520.0214	0.021346	408.3996	0.000201
1070.275	0.018797183	520.0214	0.021366	427.9897	8.35E-05
1089.3528	0.00065414	520.0214	0.021386	439.681	0.000102
1091.2725	0.025973625	520.0214	0.021406	440.0201	0.02011
1100.1225	0.024382896	520.0214	0.021426	451.6063	0.011811
1111.585	0.023099962	520.0215	0.021446	451.7742	0.001572
1111.8125	0.022385247	537.19	0.026246	455.1737	0.001308
1113.575	0.019262171	540.0338	0.033794	455.5575	0.022823
1140.8578	0.000479223	546.3363	0.032597	460.0201	0.020104
1141.7225	0.025122579	558.1275	0.009959	462.1839	0.000337
1148.185	0.030674484	560.0213	0.021314	464.7595	0.000123
1148.9913	0.024785457	560.3963	0.00987	477.4173	0.003787
1149.7188	0.018998101	561.7338	0.022378	480.0263	0.026274
1152.025	0.024796483	566.4713	0.024518	500.0201	0.020084
1153.8063	0.023590636	571.5525	0.032805	503.7274	0.00043
1156.4613	0.000676462	577.7931	0.001068	503.7798	0.000746
1162.5313	0.03680089	580.0213	0.021278	511.6328	0.001148
1189.235	0.034774582	600.0213	0.021298	520.0201	0.020048
1196.5688	0.020877812	620.0088	0.008798	526.7268	0.000915
1.7927448	0.000506936	630.5438	0.037113	531.065	0.027452
2.537524	0.020362199	639.2413	0.022933	540.0263	0.026298
3.031274	0.020876816	640.0151	0.015095	540.75	0.025882
8.691274	0.027787747	641.8213	0.025265	560.0139	0.013862
8.906274	0.028930301	649.9288	0.027011	564.0229	0.000395
9.7239812	0.000378613	651.4575	0.007861	565.95	0.012006
40.678774	0.026242041	660.0338	0.033774	566.8056	0.000356
49.035024	0.025833597	679.6775	0.046201	576.7888	0.010673
63.437524	0.021170082	680.0088	0.008794	580.02	0.020044
65.175024	0.031133726	683.0878	0.000774	596.2213	0.024557
75.925024	0.022472045	683.365	0.025194	600.0263	0.02631
93.553774	0.023380377	691.9363	0.026775	609.8848	0.000796
97.881274	0.019927229	703.8991	0.000105	613.5487	0.000388
102.86627	0.034112496	705.4025	0.040078	616.7658	0.00494
118.3014	0.000132685	711.3338	0.043809	620.0201	0.020064
129.88127	0.020144599	712.7525	0.01454	626.9032	0.000442
141.82877	0.027070401	716.6538	0.022848	638.3172	0.000353
175.03752	0.019027464	720.015	0.015024	640.0201	0.020116

178.60627	0.021693664	723.815	0.036675	645.4438	0.016391
185.01252	0.024971016	738.8275	0.010814	660.0263	0.026278
197.77615	0.00045685	740.015	0.015028	680.0201	0.020092
201.15315	0.000526797	740.0461	0.000181	700.0201	0.020128
210.64752	0.027092666	751.6238	0.030006	709.5973	0.000328
219.61747	0.005881678	752.29	0.042356	715.339	0.000354
222.15627	0.019012465	760.0213	0.021282	718.0125	0.014189
248.73752	0.024457875	773.1025	0.038228	720.0201	0.020108
249.50627	0.030686567	780.0151	0.015048	729.7	0.015063
254.58127	0.020689322	785.8275	0.011134	740.0201	0.020128
259.96252	0.021819174	798.365	0.038503	740.6104	0.001203
273.31877	0.018883776	800.0088	0.008794	745.875	0.011367
276.84377	0.024410534	811.5275	0.012824	750.6505	0.000777
279.18502	0.027077105	820.015	0.015024	760.0201	0.020108
281.68127	0.021125658	825.4019	0.000215	761.24	0.023808
287.61877	0.030823478	829.545	0.019037	763.4517	0.000766
302.86877	0.023499845	833.7788	0.00017	769.0781	0.000599
305.31877	0.021605621	838.7238	0.027312	777.1675	0.000431
305.69377	0.020294777	840.0088	0.008774	780.0263	0.026334
311.23861	0.000283124	841.9588	0.023052	781.0814	0.001166
325.18752	0.026518689	851.2063	0.034161	784.748	0.000474
325.98127	0.029760643	860.015	0.015036	800.0201	0.02012
332.87252	0.0230149	876.345	0.011147	816.7125	0.016664
343.60401	0.000408221	880.0088	0.008802	820.0201	0.020124
348.36877	0.024452503	885.5963	0.010341	822.2353	0.001544
350.70002	0.019960927	895.41	0.024544	836.5388	0.023529
375.66252	0.022096988	897.4038	0.028178	840.0263	0.026274
386.04752	0.023238292	900.015	0.015024	840.4688	0.019618
388.36252	0.0245795	903.3529	0.000258	841.2425	0.001005
395.95002	0.022368759	905.1124	0.000273	851.8602	0.006781
400.11252	0.023121767	909.9512	0.000301	856.2481	0.001111
412.46627	0.022975533	916.4988	0.026249	860.0201	0.020124
416.64377	0.022645297	920.0088	0.008798	865.7313	0.008339
424.55002	0.024434402	938.7963	0.038307	877.69	0.028045
427.53752	0.024785886	940.0213	0.021274	878.1358	7.28E-05
445.82252	0.023898131	943.2625	0.034376	880.0201	0.020132
448.65377	0.025784562	945.7463	0.02713	886.7833	0.000593
477.66422	0.001155282	949.9713	0.02307	900.0201	0.020072
481.50627	0.021781504	960.0276	0.027545	912.1027	0.000419
486.60002	0.023046718	962.2991	0.000348	920.0201	0.020048
486.93127	0.023151669	966.39	0.022199	936.8298	0.000189
488.23127	0.02256919	978.1913	0.023204	940.0201	0.020128
545.17651	0.000893028	980.0088	0.008774	940.2638	0.025562
577.38752	0.024700513	999.0963	0.009876	955.9625	0.011164
582.89377	0.021663309	1000.009	0.008794	960.0263	0.026274
593.20004	86.383522	1020.015	0.015024	980.0201	0.02009
593.20006	66.560817	1023.706	0.037242	991.9664	6.34E-05
593.2001	73.567419	1029.491	0.023903	1000.02	0.020064

593.20012	54.558251	1040.021	0.021286	1002.045	0.021521
593.6644	0.00127882	1050.427	0.000345	1002.066	0.000284
598.33127	0.027377186	1060.021	0.021278	1013.393	0.001369
608.10627	0.020141961	1069.061	0.029776	1016.906	0.004831
611.45627	0.024324734	1080.021	0.021298	1020.02	0.020096
622.54377	0.021600775	1082.229	0.024087	1040.014	0.013858
637.21877	0.029621632	1083.941	0.022654	1057.321	0.03451
640.63127	0.024502742	1087.346	0.000784	1058.665	0.02735
646.12502	0.02352282	1089.88	0.024553	1060.02	0.020044
672.89377	0.022661811	1090.848	0.024874	1060.22	0.008975
686.16252	0.021052041	1100.021	0.021278	1061.066	0.036101
689.45377	0.026003385	1103.153	0.01319	1072.892	0.00772
731.97502	0.030051446	1110.415	0.035779	1078.065	0.000732
732.73502	0.024111512	1111.328	0.052574	1080.02	0.020028
739.62502	0.040780283	1116.334	0.026867	1090	0.001771
745.06877	0.021617452	1117.825	0.000854	1100.014	0.013842
764.03752	0.024737971	1120.021	0.021274	1110.241	0.000993
782.57252	0.023490937	1127.015	0.000607	1120.014	0.013834
789.79127	0.024912526	1140.021	0.021298	1140.033	0.032556
803.81627	0.026573897	1151.378	0.033997	1160.02	0.020024
803.99377	0.027544142	1160.021	0.021298	1180.014	0.013858
815.55377	0.024022014	1161.405	0.029715	1181.254	0.026385
821.67502	0.020330841	1168.77	0.020385	1199.2	0.016873
822.43127	0.02418616	1180.021	0.021294	0.047524	0.047524
830.92502	0.02949291	1185.009	0.014195	15.02879	0.028794
838.51877	0.019096941	1185.05	0.001005	25.64877	0.023869
841.66002	0.023276844	1196.171	0.011263	30.02254	0.022544
845.82502	0.022919386	0.00337	0.00337	40.92377	0.014463
853.95002	0.023297258	7.331274	0.013677	45.02254	0.022544
870.31002	0.023644964	10.21877	0.03105	48.73627	0.017112
898.20627	0.02490592	20.00196	0.00196	60.03502	0.035024
904.49721	0.001239662	23.32502	0.008824	75.02879	0.028794
906.92502	0.02152945	30.53002	0.013154	84.67502	0.024111
908.06252	0.023771075	33.37185	0.000387	90.02879	0.028794
914.86877	0.022554318	39.84377	0.010946	105.0288	0.028794
951.14377	0.018963601	40.00264	0.002642	109.7863	0.012712
1001.125	0.019880316	50.46877	0.024202	116.98	0.029663
1016.425	0.023719687	51.48061	0.000396	118.485	0.013076
1017.2475	0.024856091	60.00162	0.00162	120.0413	0.041274
1019.85	0.019578555	71.45166	0.000981	127.625	0.024085
1030.0875	0.019199094	74.33752	0.011716	135.0288	0.028794
1053.025	0.023135073	77.20866	0.001247	136.7025	0.011427
1072.3563	0.023502625	80.00093	0.00093	136.81	0.016193
1078.725	0.023666154	81.33752	0.01625	149.2113	0.024735
1088.5725	0.027236206	96.09252	0.0111	150.035	0.035044
1114.15	0.01938544	100.003	0.00297	165.0288	0.028794
1115.7038	0.024287915	110.72	0.001587	174.1525	0.011075
1119.25	0.020486258	120.0024	0.0024	180.0475	0.047544

1119.4413	0.024688784	120.53	0.008914	189.6013	0.013377
1124.541	0.000697592	121.405	0.009408	195.0288	0.028794
1134.4875	0.023489416	122.9872	0.00472	202.1063	0.023217
1146.5474	0.000460333	133.4863	0.014617	210.0288	0.028814
1147.2	0.022840364	140.0014	0.00141	225.0288	0.028794
1148.3313	0.020436545	143.5363	0.014521	240.035	0.035044
1156.7563	0.02098415	146.6813	0.010326	255.0288	0.028814
1182.2475	0.026812291	160.0004	0.00041	265.2988	0.018342
8.447524	0.022600446	176.5903	0.005474	270.0225	0.022524
22.760024	0.023481597	177.6363	0.01158	285.0226	0.022564
24.414969	0.000514096	180.003	0.003	290.34	0.012175
32.543774	0.018905641	186.6625	0.015227	293.2075	20.19708
44.928774	0.025913705	187.2217	6.00E-05	293.2513	19.39172
48.193774	0.027124419	195.5625	0.012321	300.0288	0.028794
70.337524	0.021026174	198.484	0.000841	315.0225	0.022544
78.556274	0.020144043	198.5175	0.000439	327.8363	0.012867
82.893647	0.000349957	200.0009	0.00087	330.0225	0.022544
92.285024	0.040425471	220.0007	0.00066	345.0225	0.022544
100.18127	0.028863435	240.0031	0.003113	353.2188	0.023514
108.05627	0.040259278	258.6188	0.013991	353.706	0.000791
113.96252	0.021345272	260.0026	0.00264	355.925	0.019495
127.84127	0.025512513	261.3938	0.009049	360.035	0.035024
135.33752	0.02919878	269.0938	0.020279	362.2513	0.015191
139.35002	0.02040046	271.2625	0.008292	365.3388	0.013151
161.06622	0.000429286	276.6911	0.011448	369.7469	0.000329
183.06252	0.024043948	280.0029	0.00285	375.0226	0.022564
203.58127	0.022594584	293.205	54.86354	378.2988	0.013187
211.03752	0.022472869	293.2363	63.47083	390.0225	0.022544
216.92502	0.020442943	294.9875	0.02109	399.2363	0.01663
218.16252	0.024668394	300.0014	0.00135	405.0225	0.022544
227.25002	0.024979268	314.1613	0.010579	420.035	0.035024
227.89752	0.027761342	314.98	0.013708	427.2571	0.000792
231.28127	0.019840627	319.2625	0.021099	429.83	0.015634
232.06002	0.034909941	320.0012	0.00115	435.0225	0.022544
250.45002	0.019665489	321.425	0.009756	448.3275	0.012743
251.20627	0.020888072	328.3063	0.024741	450.0225	0.022544
262.29752	0.024044601	340.0014	0.00144	451.08	0.025945
282.12877	0.026334799	340.9938	0.02053	465.0225	0.022544
284.93752	0.019854685	354.2375	0.019707	480.0289	0.028845
305.01877	0.030132777	360.0022	0.0022	488.365	0.012641
309.90627	0.022445171	380.0012	0.00119	495.0225	0.022544
326.07502	0.0223342	384.9938	0.02092	496.045	0.013426
341.19377	0.021519526	395.5188	0.012677	510.0225	0.022544
347.41002	0.025762624	399.1742	0.000234	515.8238	0.012282
352.36877	0.021316625	400.0013	0.00125	518.5813	0.024654
361.85002	0.024301102	412.5688	0.018214	522.2488	0.012247
366.35627	0.020756533	414.6063	0.008137	523.8913	0.012912
382.01563	0.000256243	420.0008	0.00081	525.035	0.035044



385.83502	0.02283269	425.1336	0.000563	525.7063	0.020537
405.69377	0.020322127	437.1813	0.024838	530.2163	0.015612
415.03127	0.019482567	440.0023	0.00231	533.8488	0.013747
421.76877	0.020239212	441.0313	0.011373	540.035	0.035044
426.48752	0.042118701	456.6313	0.010953	540.5763	0.007977
427.14377	0.020416715	460.0007	0.00071	541.0975	0.013263
455.45567	0.000741897	464.78	0.01034	555.0288	0.028794
455.87502	0.020980411	466.474	0.00394	557.4663	0.010423
457.65627	0.025523121	480.0019	0.00191	565.455	0.028019
461.74377	0.019875938	500.0037	0.00366	570.035	0.035044
489.43507	0.000339721	513.8875	0.008854	585.0288	0.028794
492.08752	0.018877328	520.0006	0.00064	600.0475	0.047544
516.40002	7.773621	536.7486	0.000467	600.0875	0.020518
537.18752	0.023746412	537.03	0.012567	603.8963	0.014154
546.32877	0.02509735	540.0007	0.00066	612.46	0.021331
561.73127	0.019878366	557.4425	0.01292	615.0226	0.022564
566.46877	0.022017747	560.0004	0.00041	624.2871	0.000342
571.54377	0.024054694	573.5996	0.01425	630.0225	0.022544
593.20004	35.082479	573.7545	0.000371	632.1575	0.00803
593.20006	32.81366	580.0004	0.00039	645.0225	0.022544
630.53502	0.028362696	600.0007	0.00066	645.9763	0.012333
639.23752	0.019183107	601.9698	0.020953	648.6588	0.010296
641.81877	0.022764694	609.2813	0.022858	652.12	0.010679
649.92502	0.023260748	613.2467	0.000421	654.8213	0.013165
651.4499	0.000232321	616.701	0.000418	657.6588	0.013693
679.66252	0.031200997	620.0041	0.00407	660.0289	0.02887
683.11252	0.025531236	640.001	0.00098	668.1538	0.014787
683.36252	0.022694	660.0011	0.00108	674.1763	0.015722
691.93502	0.025525465	664.025	0.008298	675.0225	0.022544
703.91877	0.019765145	671.8625	0.008788	675.7188	0.023498
705.38127	0.018828197	675.1813	0.017082	678.38	0.024451
711.31252	0.022559332	680.0032	0.0032	686.4488	0.030682
712.76252	0.024539686	692.5794	0.000406	690.0225	0.022544
716.65002	0.019097867	700.0037	0.003654	692.7838	0.009706
723.80002	0.021675088	700.9563	0.016194	693.0175	0.028543
738.83752	0.020813769	712.83	0.009628	697.435	0.01605
740.06877	0.022867252	715.3925	0.0088	705.0225	0.022524
751.62252	0.028755969	720.0011	0.00106	709.805	0.012592
752.26877	0.021106012	727.1192	0.001903	720.0289	0.028845
773.09377	0.029477937	740.0024	0.00235	728.0713	0.013684
785.84377	0.027383883	746.9375	0.0302	734.2163	0.000244
798.35002	0.023503273	747.3063	0.020721	735.0226	0.022564
811.53752	0.022824082	747.9563	0.013445	750.0225	0.022544
825.42502	0.023329157	760.0012	0.00119	765.0225	0.022544
829.52638	0.000396523	778.6398	0.001739	771.2138	0.009709
833.80627	0.027698386	780.0014	0.00137	774.2738	0.017596
838.72252	0.026061652	780.7613	0.011386	780.0288	0.028794
841.95627	0.020551638	790.4188	0.022612	781.0838	0.013763

851.19752	0.025411076	795.9363	0.013822	784.6263	0.007785
876.33437	0.000491831	797.6655	0.000289	790.6513	0.013152
885.60627	0.020341466	800.0024	0.00241	795.0225	0.022544
895.40627	0.020794424	804.5688	0.020175	805.2313	0.020231
897.40002	0.024428058	809.3488	0.008776	806.6025	0.02304
903.38127	0.028599861	813.4688	0.015404	810.0225	0.022544
905.13127	0.019192005	819.105	0.010856	812.285	0.014031
909.97502	0.024134389	820.001	0.00098	813.6763	0.012246
916.49752	0.024999192	820.3637	0.001572	814.0038	0.01175
938.78127	0.023306766	820.4278	0.005548	821.355	0.027618
943.25377	0.02562625	820.4675	0.018319	825.0225	0.022544
945.74377	0.024629545	826.2313	0.014722	830.57	0.019226
949.96877	0.020570234	840.0009	0.00087	838.7638	0.008257
962.31877	0.02000621	860.0017	0.00169	840.0288	0.028794
966.38752	0.019698726	869.3045	0.000824	841.2642	0.000287
978.18752	0.0194543	880.0007	0.00071	848.2863	0.01633
999.10627	0.019876336	881.2625	0.009135	855.0225	0.022544
1023.6975	0.028491786	887.3974	0.000311	855.9138	0.022263
1029.4875	0.020152668	900.0011	0.0011	870.0225	0.022544
1050.45	0.02325019	920.0038	0.00378	881.2825	0.011404
1069.06	0.028526078	923.4331	0.006804	885.0225	0.022544
1082.225	0.020336747	926.2242	0.001258	885.0226	0.022564
1083.9375	0.018904322	940.0009	0.00088	890.0975	0.014775
1087.3688	0.024092596	960.0017	0.00166	894.3263	0.011309
1089.8913	0.035802746	965.2738	0.014762	897.3725	0.011295
1090.8438	0.021123871	980.0026	0.00262	900.035	0.035044
1103.1625	0.023190068	984.0166	0.000405	908.1238	0.01254
1110.4188	0.03952888	985.275	0.022708	915.0226	0.022564
1111.3	0.025074078	1000.001	0.00144	917.6588	0.011158
1116.3313	0.024367099	1008.866	0.000209	920.5525	0.012455
1117.8438	0.019783293	1010.538	0.008601	930.0225	0.022544
1127.0375	0.023319375	1017.27	4.20E-05	945.0226	0.022564
1151.3625	0.018997253	1020.001	0.00104	950.5675	0.013221
1161.4038	0.028464715	1020.154	0.000969	960.0288	0.028794
1168.7498	0.000202328	1024.169	0.023223	968.6188	0.021679
1185.0188	0.02419502	1040.001	0.0007	975.0225	0.022544
1185.0688	0.020209719	1060.001	0.00068	982.8925	0.017508
1196.1813	0.021263046	1070.275	0.018797	990.0225	0.022544
608.08722	0.001091431	1080	0.00041	998.2488	0.01324
611.45877	0.026824734	1089.352	0.000126	1005.023	0.022544
620.01379	0.01379	1091.256	0.009724	1006.281	0.022452
622.55877	0.036600775	1100.001	0.00143	1020.029	0.028794
637.22752	0.038371632	1100.106	0.008133	1027.409	0.014495
640.01379	0.01379	1111.575	0.0131	1035.035	0.035024
640.60755	0.000777493	1111.813	0.022389	1036.249	0.012355
646.10242	0.000916085	1113.556	0.000556	1044.164	0.013353
660.02004	0.020036	1120.002	0.00195	1045.769	0.000426
672.89627	0.025161811	1140.003	0.003312	1045.805	0.015957

680.02004	0.020044	1140.858	0.000276	1050.035	0.035024
686.17127	0.029802041	1141.719	0.021373	1055.358	0.019569
689.45252	0.024753385	1148.163	0.008174	1057.201	0.012657
700.01378	0.013782	1148.975	0.008535	1063.485	0.013267
720.02004	0.02004	1149.702	0.001797	1065.029	0.028794
731.94542	0.000444541	1152.025	0.024796	1080.035	0.035044
732.74002	0.029111512	1153.784	0.000915	1086.485	0.000371
739.60877	0.024530283	1156.461	0.000787	1095.035	0.035044
740.01378	0.013782	1160.001	0.0012	1110.029	0.028794
745.07127	0.024117452	1162.495	0.000585	1123.18	0.042466
760.02005	0.020048	1180	0.00039	1125.029	0.028794
764.04002	0.027237971	1189.213	0.012275	1127.239	0.013908
780.02003	0.020032	1196.563	0.014628	1140.048	0.047544
782.58377	0.034740937	0.015056	0.015056	1149.82	0.011078
800.02006	0.020064	8.467524	0.0426	1154.865	0.009603
803.81502	0.025323897	20.01508	0.015076	1155.035	0.035024
803.96765	0.001421839	22.78002	0.043482	1160.255	8.14E-05
815.55877	0.029022014	24.41492	0.000468	1161.221	0.012191
820.01379	0.013786	32.52706	0.002187	1166.846	0.011388
821.68377	0.029080841	40.01506	0.015064	1170.029	0.028794
822.43377	0.02668616	44.93752	0.034664	1183.644	0.020477
830.896	0.000469869	48.16707	0.000417	1183.701	0.007543
838.50154	0.001863745	60.02129	0.021294	1185.035	0.035024
840.02005	0.020048	70.34627	0.029776	1186.956	0.024977
841.66502	0.028276844	78.53683	0.0007	1194.603	0.013033
845.82752	0.025419386	80.01506	0.01506	0.035084	0.035084
853.95252	0.025797258	82.90877	0.015477	9.173774	0.027468
870.31502	0.028644964	92.28127	0.036675	15.02879	0.028794
880.02004	0.020044	100.0151	0.015056	24.99002	0.010124
898.20877	0.02740592	100.1534	0.000969	27.29893	0.000882
900.02005	0.020052	108.0475	0.031509	30.02258	0.022584
904.49705	0.001072589	113.9422	0.001048	30.22127	0.01219
906.92752	0.02402945	120.0151	0.015068	36.33752	0.024047
908.03981	0.001060501	127.8563	0.040513	45.02256	0.022564
914.87752	0.031304318	135.3194	0.011086	60.02879	0.028794
920.01381	0.013814	139.3308	0.001167	69.57377	0.013935
940.01379	0.013786	140.0151	0.015056	75.02881	0.028814
951.15877	0.033963601	160.0151	0.015056	81.84607	0.00096
960.02003	0.020032	161.0686	0.002757	89.63377	0.012256
980.01378	0.013778	183.065	0.026544	90.02881	0.028814
1000.0138	0.01379	200.0151	0.015056	95.99002	0.011919
1001.1057	0.000532262	203.5594	0.000751	105.0288	0.028834
1016.4275	0.026219687	211.017	0.001903	120.0475	0.047524
1017.2525	0.029856091	216.9053	0.000724	121.6525	0.012167
1019.8588	0.028328555	218.1788	0.040922	132.8763	0.012294
1020.02	0.020028	220.0151	0.015056	135.035	0.035024
1030.0963	0.027949094	227.227	0.001983	141.08	0.026803
1040.0138	0.013786	227.9063	0.036511	141.2725	0.011073

1053.0275	0.025635073	231.2625	0.001057	144.7175	0.012886
1060.0138	0.013806	232.0625	0.03741	150.0288	0.028794
1072.3775	0.044752625	240.0213	0.021274	150.8988	0.029802
1078.7275	0.026166154	250.4588	0.028415	153.1213	0.009437
1080.0138	0.013786	251.21	0.024638	158.1625	0.022522
1100.0138	0.013782	260.015	0.015044	165.0288	0.028814
1114.1588	0.02813544	262.3125	0.039045	168.8913	0.012034
1115.7088	0.029287915	280.0213	0.021274	174.13	0.01162
1119.2713	0.041736258	282.1375	0.035085	180.0475	0.047544
1119.4463	0.029688784	284.93	0.012371	195.0288	0.028814
1120.0138	0.013786	300.0213	0.021294	200.35	0.024974
1124.5409	0.000551645	304.9988	0.010141	200.5488	0.02577
1134.49	0.025989416	309.884	0.000194	210.0288	0.028794
1140.0138	0.013802	320.0151	0.015072	210.9863	0.011365
1146.5475	0.0006052	326.0535	0.000791	217.9463	0.012165
1147.182	0.004862396	340.0151	0.01506	220.9319	0.001193
1148.34	0.029186545	341.177	0.004723	225.035	0.035024
1156.79	0.05473415	347.4188	0.034513	231.7275	0.012441
1160.0138	0.013786	352.3713	0.023817	232.9775	0.011607
1180.0138	0.013806	360.0213	0.021294	240.0475	0.047524
1182.2463	0.025562291	361.8475	0.021801	246.4313	0.030891
680.01379	0.013794	366.3375	0.001986	255.0288	0.028834
683.08827	0.001280903	380.0151	0.01506	265.165	0.009166
683.36502	0.025194	382.0275	0.012152	265.3413	0.014141
691.93377	0.024275465	385.85	0.037833	269.3213	0.011834
700.0138	0.013802	400.0151	0.015076	270.0226	0.022564
703.94002	0.041015145	405.6845	0.011002	285.0225	0.022524
705.40252	0.040078197	415.04	0.028233	285.8413	0.021591
711.32752	0.037559332	421.79	0.041489	289.8675	0.017263
712.73874	0.000750726	426.48	0.034623	297.74	0.012844
716.65877	0.027847867	427.1247	0.001377	300.0288	0.028794
723.81502	0.036675088	440.0213	0.021274	304.9488	0.012889
738.81809	0.001377413	455.4666	0.011634	310.365	0.014349
740.0138	0.013802	455.8913	0.037234	314.1663	0.013852
740.07127	0.025367252	457.6326	0.00183	315.0225	0.022524
751.62127	0.027505969	460.0151	0.015068	330.0226	0.022584
752.29002	0.042356012	461.76	0.03613	330.31	0.013199
773.09002	0.025727937	480.0214	0.021345	341.5288	0.019003
780.03253	0.032532	489.4373	0.002596	343.495	0.012746
785.81764	0.001246997	492.0963	0.027627	345.0225	0.022524
798.36502	0.038503273	500.0151	0.015048	355.8747	0.001853
800.02004	0.020044	508.6525	0.026121	359.7275	0.025642
811.5151	0.000399604	520.0151	0.015056	360.0288	0.028794
820.02004	0.020036	537.19	0.026246	375.0226	0.022564
825.44002	0.038329157	546.3375	0.033847	389.17	0.010524
829.52746	0.001476992	558.1194	0.001838	390.0225	0.022524
833.77991	0.001330758	560.015	0.01504	390.6925	0.017133
838.72127	0.024811652	560.389	0.002624	395.17	0.014743

840.02005	0.020048	561.74	0.028628	405.0226	0.022564
841.96502	0.029301638	566.4788	0.032018	417.3425	0.028287
851.19627	0.024161076	571.5463	0.026555	420.0288	0.028774
860.01379	0.01379	577.7948	0.00277	428.4075	0.009742
876.33416	0.000283446	580.0151	0.015056	435.0226	0.022584
880.02002	0.020024	600.015	0.015044	439.0525	0.010939
885.58672	0.000786481	620.0151	0.015056	450.0225	0.022524
895.41502	0.029544424	630.5438	0.037113	462.7363	0.014789
897.40252	0.026928058	639.2538	0.035437	463.1963	0.009873
900.02005	0.020052	640.0151	0.01506	465.0226	0.022564
903.39002	0.037349861	641.8213	0.025265	478.7488	0.028152
905.14002	0.027942005	649.9425	0.040769	480.0289	0.02887
909.95207	0.001180744	651.465	0.015365	495.0226	0.022564
916.50877	0.036249192	660.0213	0.021294	496.8088	0.010888
920.01379	0.013794	679.6488	0.017451	498.8713	0.009606
938.79627	0.038306766	680.0151	0.015064	501.3325	0.01077
940.02002	0.020024	683.088	0.001042	509.0388	0.009454
943.25252	0.02437625	683.365	0.025194	510.0226	0.022584
945.74627	0.027129545	691.9425	0.033025	511.1246	0.00022
949.97752	0.029320234	700.0151	0.015064	512.375	0.022484
960.02005	0.020052	703.9225	0.023515	513.2863	0.034712
962.32752	0.02875621	705.38	0.017594	525.035	0.035024
966.39627	0.028448726	711.2988	0.008813	540.0413	0.041274
978.19627	0.0282043	712.7484	0.010442	541.21	0.014694
980.02002	0.020024	716.6663	0.035352	555.0288	0.028814
999.08699	0.000588069	720.0338	0.033778	559.25	0.023426
1000.0138	0.01381	723.7863	0.007925	570.035	0.035024
1020.02	0.020048	738.8196	0.002867	583.4287	0.000212
1023.6963	0.027241786	740.0213	0.021326	584.315	0.011973
1029.4963	0.028902668	740.0491	0.003163	585.035	0.035044
1040.0138	0.013806	751.63	0.03626	587.5175	0.012198
1050.4525	0.02575019	752.2613	0.013622	600.0475	0.047524
1060.0138	0.013806	773.09	0.025728	601.7738	0.016272
1069.0588	0.027276078	780.0213	0.021294	604.1938	0.022058
1080.0138	0.013806	785.817	0.00057	615.0226	0.022584
1082.2463	0.041586747	798.3363	0.009757	623.5463	0.014148
1083.9463	0.027654322	800.0213	0.021295	624.7775	0.014178
1087.3713	0.026592596	811.5174	0.002652	625.6588	0.013014
1089.8838	0.028302746	825.4225	0.020829	626.7675	0.014995
1090.8588	0.036123871	829.54	0.014037	628.545	0.013623
1100.0138	0.013802	833.7799	0.001275	630.0225	0.022544
1103.141	0.001617952	838.7313	0.034812	645.0225	0.022524
1110.4088	0.02952888	841.9725	0.036806	646.29	0.010562
1111.3025	0.027574078	851.2063	0.034165	647.845	0.007778
1116.3338	0.026867099	860.0151	0.015072	660.0288	0.02882
1117.865	0.041033293	876.3463	0.012397	675.0225	0.022524
1120.0138	0.013806	880.0151	0.015064	676.2363	0.035722
1127.0186	0.004416598	885.598	0.01208	690.0013	0.010282

1140.0138	0.013802	895.4363	0.050794	690.0226	0.022564
1151.3838	0.040247253	897.41	0.034428	693.0588	0.011799
1160.0263	0.026274	900.0275	0.027536	696.4038	0.010055
1168.7501	0.000467898	903.3725	0.01985	701.7238	0.011962
1180.0138	0.013806	905.114	0.001866	705.0225	0.022544
1184.9949	0.000295174	909.954	0.003056	708.305	0.026415
1185.0526	0.004023694	916.5238	0.051253	720.0288	0.02882
1196.1736	0.013586393	920.0213	0.021286	735.0225	0.022544
0.0007	0.0007	938.7675	0.009561	743.5325	0.008256
2.540024	0.019231492	940.0151	0.015076	748.6963	0.009279
5.537524	0.011643057	943.2625	0.034376	750.0225	0.022524
20.00171	0.00171	945.7538	0.034634	765.0225	0.022524
23.035859	0.000521343	949.985	0.036824	780.0288	0.028774
40.002	0.002	960.0213	0.021294	795.0226	0.022584
42.075024	0.01424335	962.3055	0.006709	810.0226	0.022564
60.00162	0.00162	966.4038	0.035953	825.0225	0.022544
61.683073	0.001249664	978.205	0.036958	840.0288	0.028774
71.468774	0.022060904	980.0151	0.015064	849.7125	0.021872
74.854928	0.00028562	999.0942	0.007789	855.0226	0.022564
80.00168	0.00168	1000.015	0.01506	870.0226	0.022584
100.00116	0.00116	1020.015	0.015056	875.4675	0.012865
102.26332	4.20E-05	1023.706	0.037242	885.0226	0.022564
118.59377	0.015000464	1029.505	0.037657	893.7088	0.013001
120.00141	0.00141	1040.015	0.015056	899.3763	0.010793
122.03826	0.000468685	1050.429	0.001977	899.8163	0.013353
139.86252	0.011968248	1060.015	0.015056	900.0288	0.028794
140.00166	0.00166	1069.075	0.043526	901.6204	0.000883
144.32127	0.028411308	1080.015	0.015056	904.0688	0.022848
149.27987	0.000331541	1082.241	0.036591	909.365	0.009258
159.81252	0.014348332	1083.954	0.035158	914.7838	0.014567
160.00193	0.00193	1087.348	0.003186	915.0225	0.022544
162.38752	0.010411444	1089.893	0.037057	915.5175	0.017317
171.77417	0.000321115	1090.86	0.037378	920.88	0.013328
173.23752	0.011213841	1100.015	0.015056	930.0225	0.022544
175.76174	0.000259734	1103.14	0.000721	936.6988	0.013344
180.0017	0.0017	1110.409	0.029529	939.26	0.012051
181.33127	0.02169872	1111.303	0.027574	942.78	0.01263
181.40877	0.034135255	1116.334	0.026867	945.0226	0.022584
183.83127	0.023413678	1117.848	0.023533	948.3513	0.007758
191.73127	0.015363793	1120.015	0.015056	954.52	0.011701
200.00037	0.00037	1127.016	0.001647	957.4888	0.011024
220.00116	0.00116	1140.028	0.027552	960.035	0.035024
238.39377	0.015462438	1151.361	0.017747	963.0463	0.0117
240.00091	0.00091	1160.015	0.015052	975.0225	0.022524
260.00223	0.00223	1161.413	0.037215	975.595	0.022885
263.82894	0.001235151	1168.753	0.003024	977.3519	0.000308
267.64002	0.020846674	1180.015	0.015056	990.0225	0.022524
280.00175	0.00175	1185.004	0.009355	1005.023	0.022564

280.4413	0.000310793	1185.051	0.002766	1005.628	0.009577
300.00087	0.00087	1196.161	0.000784	1006.841	0.013072
320.00359	0.00359	0.030024	0.030024	1011.014	0.008364
327.7601	0.001116813	1.801274	0.009036	1020.035	0.035024
337.20002	0.000233593	2.537524	0.020362	1020.035	0.035044
339.49197	0.000328734	3.020024	0.009627	1020.035	0.035064
360.00164	0.00164	8.676274	0.012788	1020.035	0.035084
361.11877	0.015711553	8.888774	0.01143	1020.035	0.035104
378.7603	0.000337406	9.732524	0.008921	1020.035	0.035124
380.00279	0.00279	20.01752	0.017524	1020.035	0.035144
400.00268	0.00268	40.01752	0.017524	1020.035	0.035164
406.51249	0.001335553	40.66377	0.011242	1020.035	0.035184
417.24377	0.014585741	49.02127	0.012084	1020.035	0.035204
420.00162	0.00162	60.01752	0.017524	1020.035	0.035224
422.68127	0.013918852	63.43752	0.02117	1030.078	0.010481
429.79394	0.00078875	65.16377	0.019884	1031.701	0.015612
440.00204	0.00204	75.91377	0.011222	1035.035	0.035044
460.00252	0.00252	80.02377	0.023774	1040.72	0.009444
463.16252	0.023155298	93.55752	0.02713	1050.029	0.028814
469.96559	0.001357176	97.87252	0.011177	1065.029	0.028814
474.51877	0.011294455	100.0238	0.023794	1068.636	0.023921
480.00077	0.00077	102.8525	0.020362	1070.753	0.00962
489.49695	0.000345563	118.3138	0.012509	1072.018	0.029459
500.00231	0.00231	120.03	0.030024	1072.288	0.018779
503.08133	0.00079233	129.8738	0.012645	1080.048	0.047524
593.17759	73.177594	140.0238	0.023774	1084.233	0.019403
593.18071	56.136254	141.82	0.01832	1095.035	0.035044
593.18073	53.18073	160.0238	0.023774	1097.219	0.02003
593.18079	33.18079	175.0413	0.022777	1102.553	0.014008
593.18193	35.719538	178.595	0.010444	1103.644	0.018956
593.18496	11.580666	180.03	0.030044	1107.28	0.027632
593.18712	59.713374	185.0125	0.024971	1110.035	0.035024
593.19609	13.196091	197.7888	0.013082	1125.035	0.035024
600.00041	0.00041	200.0238	0.023774	1139.052	0.000492
611.99109	0.000284362	201.1638	0.011152	1140.048	0.047544
620.00269	0.00269	210.6325	0.012093	1155.029	0.028794
640.00258	0.00258	219.62	0.008431	1159.784	0.013537
648.45195	0.001721136	220.0238	0.023794	1162.011	0.028764
660.00269	0.00269	222.1625	0.025262	1163.488	0.022886
660.10002	0.011798163	240.03	0.030024	1165.276	0.01411
660.23127	0.011810593	248.7288	0.015708	1169.538	0.022577
662.78515	0.000454147	249.4763	0.000717	1170.035	0.035024
677.89377	0.01130587	254.5725	0.011939	1185.029	0.028814
680.00131	0.00131	259.955	0.014319	1193.779	0.014188
686.35007	0.000165686	260.0175	0.017524	7.338774	0.021177
690.06877	0.014854024	273.3017	0.001796	10.19627	0.00855
691.01127	0.016839859	276.8438	0.024411	20.03502	0.035024
697.17843	0.000509881	279.1713	0.013327	23.32752	0.011324

700.0033	0.0033	280.0175	0.017524	33.38752	0.016062
720.00133	0.00133	281.6713	0.011126	39.85752	0.024696
723.17499	0.000653522	287.5891	0.001187	40.03504	0.035044
724.15135	0.001180916	300.0175	0.017524	50.45377	0.009202
726.10877	0.021551462	302.8688	0.0235	51.48069	0.000482
727.2932	0.000781967	305.3225	0.025356	60.03504	0.035044
740.00069	0.00069	305.6975	0.024045	71.46252	0.011845
742.46877	0.010712824	311.2513	0.012945	74.34877	0.022966
747.35256	6.00E-05	320.0175	0.017544	77.21877	0.011361
760.00198	0.00198	325.1725	0.011519	80.03504	0.035044
770.34627	0.025229099	325.9517	0.000173	81.34502	0.02375
775.99877	0.022214299	332.865	0.015515	96.09377	0.01235
780.00317	0.00317	340.0238	0.023774	100.035	0.035024
788.73151	0.000589212	343.6263	0.022676	110.7313	0.01287
792.74627	0.022651493	348.3446	0.000245	120.0413	0.041274
800.00123	0.00123	350.6801	6.00E-05	120.5375	0.016414
803.86867	0.000150798	360.0175	0.017524	121.4125	0.016908
805.57502	0.011346304	375.6513	0.010847	122.9827	0.000217
820.0027	0.0027	380.0175	0.017544	140.035	0.035044
822.51752	0.014726409	386.0388	0.014488	143.5375	0.015767
828.26877	0.021441838	388.3613	0.02333	146.695	0.024076
840.00328	0.0032825	395.9288	0.0011	160.035	0.035024
854.74377	0.01552071	400.0175	0.017524	176.5861	0.001306
860.00231	0.00231	400.1038	0.014372	177.6375	0.01283
860.29673	0.000512044	412.465	0.021726	180.035	0.035044
861.82917	0.001846863	416.6475	0.026395	186.68	0.032727
866.46252	0.014514604	420.0175	0.017524	187.2375	0.015852
870.49377	0.011193551	424.55	0.024434	195.5738	0.023571
879.15159	0.000749903	427.5263	0.013536	198.4833	0.000185
880.00295	0.00295	440.0175	0.017544	198.5313	0.01426
900.00141	0.00141	445.8075	0.008898	200.035	0.035044
905.11252	0.014034499	448.645	0.017035	220.035	0.035044
905.81236	0.001452425	460.0175	0.017544	229.7813	0.015803
920.00146	0.00146	477.6763	0.013209	238.3563	0.01477
930.76356	4.20E-05	480.0175	0.017544	240.035	0.035045
930.79447	0.001776739	481.4855	0.000984	258.63	0.025241
937.42133	0.008354261	486.6038	0.026797	260.035	0.035044
940.00165	0.00165	486.9091	0.000947	261.4025	0.017799
941.97502	0.012920645	488.2108	0.002052	269.085	0.011525
944.40347	0.000543718	500.0175	0.017524	271.265	0.010792
946.42502	0.012017518	506.8338	0.017252	276.6938	0.014141
946.94602	0.000564263	519.633	0.000333	280.035	0.035044
953.86127	0.016594969	520.0238	0.023794	294.9775	0.01109
956.19277	0.001593557	526.6398	0.000541	300.035	0.035024
957.54877	0.013660013	538.6663	0.024401	314.1625	0.011829
960.00444	0.00444	540.03	0.030044	319.2638	0.022349
980.00094	0.00094	545.1888	0.013159	320.035	0.035024
984.69377	0.012829534	560.0238	0.023774	321.4388	0.023506



998.71502	0.024503752	577.3875	0.024701	328.2913	0.009741
998.74377	0.011326364	582.8938	0.021663	340.035	0.035044
999.14366	6.00E-05	593.6763	0.013157	340.985	0.01178
1020.0031	0.00307	598.315	0.011127	354.235	0.017207
1033.3934	0.000797325	600.03	0.030024	360.035	0.035044
1040.0015	0.00147	608.095	0.008892	380.035	0.035044
1045.2049	0.006917283	611.4488	0.016825	384.985	0.01217
1049.2828	0.000202888	622.5438	0.021601	395.5263	0.020177
1059.115	0.019263361	637.2038	0.014622	399.1875	0.013535
1060.0014	0.00143	640.0176	0.017595	400.035	0.035024
1062.6822	0.000861283	640.6413	0.034503	412.5588	0.008214
1080.0019	0.00191	646.1138	0.012273	414.6088	0.010637
1087.4031	0.000838858	660.0238	0.023774	420.0413	0.041274
1087.9063	0.011715015	672.8715	0.000374	425.1613	0.028235
1099.8275	0.022863894	680.0175	0.017544	437.1725	0.016088
1100.0022	0.00224	686.16	0.018552	440.035	0.035044
1112.5463	0.021095572	689.445	0.017253	441.0275	0.007623
1114.4313	0.011170113	700.0175	0.017524	456.64	0.019703
1117.4871	0.000375259	720.0175	0.017524	460.035	0.035044
1120.0025	0.00249	731.9575	0.012551	464.7813	0.01159
1129.6438	0.014470277	732.72	0.009112	466.4875	0.017473
1137.5705	0.00477318	739.585	0.000715	480.035	0.035024
1138.4275	0.000997889	740.0175	0.017544	500.035	0.035024
1139.7675	0.016236268	745.0474	0.000281	513.9013	0.022604
1140.0017	0.00168	760.0175	0.017544	520.035	0.035024
1151.0855	4.20E-05	764.03	0.017238	536.7625	0.014358
1160.002	0.00197	780.0175	0.017524	540.035	0.035044
1160.9813	0.015291298	782.5588	0.009741	560.035	0.035044
1164.5375	0.01080235	789.7775	0.011163	573.5857	0.000304
1180.0022	0.00222	800.0175	0.017524	573.7551	0.00106
0.00145	0.00145	803.8013	0.011574	580.035	0.035044
1.4885834	0.000327488	803.9763	0.010044	600.035	0.035024
1.593774	0.011291542	815.5463	0.016522	601.965	0.016206
20.00343	0.00343	820.0175	0.017544	609.2725	0.014108
22.128027	0.001120687	821.6725	0.017831	613.2625	0.016224
26.952524	0.023460381	822.4313	0.024186	616.7125	0.011933
40.00175	0.00175	830.9075	0.011993	620.035	0.035024
47.970636	0.000799446	838.5075	0.007847	640.035	0.035044
48.552524	0.023089162	840.0175	0.017544	660.035	0.035024
60.00292	0.00292	841.6463	0.009527	664.0388	0.022048
65.890024	0.031700119	845.8175	0.015419	671.8713	0.017538
66.100024	0.013030641	853.9413	0.014547	675.2113	0.047082
66.108774	0.019932424	860.0238	0.023774	680.035	0.035044
76.406274	0.012995295	870.3088	0.022395	692.5798	0.000776
80.0023	0.0023	880.0175	0.017544	700.035	0.035024
82.498774	0.015222989	898.2063	0.024906	700.9638	0.023694
85.021598	0.000321797	900.03	0.030024	715.4	0.0163
95.215024	0.019041442	904.5075	0.011551	727.1177	0.000414

100.00066	0.00066	906.909	0.005537	740.035	0.035044
108.88813	0.000915949	908.0663	0.027521	746.9163	0.00895
114.35917	0.000196575	914.86	0.013804	747.315	0.029471
114.77099	0.000680313	920.0175	0.017544	747.9763	0.033445
120.00041	0.00041	940.0175	0.017524	760.035	0.035044
126.71252	0.015627921	951.1363	0.011464	778.65	0.012004
132.14171	0.000707036	960.03	0.030024	780.0413	0.041294
140.00116	0.00116	980.0175	0.017524	790.4088	0.012612
146.99627	0.024976426	1000.018	0.017524	795.9375	0.015072
160.00066	0.00066	1001.114	0.00863	797.6813	0.016089
165.08377	0.019404638	1016.402	0.000363	800.035	0.035044
180.00093	0.00093	1017.239	0.016106	804.56	0.011425
188.23127	0.012941127	1019.85	0.019579	813.48	0.026654
200.00139	0.00139	1020.018	0.017524	820.035	0.035044
206.98138	0.001129617	1030.069	0.000401	820.375	0.012946
208.05877	0.019504536	1040.024	0.023794	820.4227	0.000477
220.00041	0.00041	1053.003	0.000569	820.4625	0.013319
236.17502	0.015587482	1060.024	0.023774	826.2425	0.025972
236.78127	0.020530611	1072.346	0.013503	840.035	0.035044
240.00041	0.00041	1078.716	0.014916	860.035	0.035044
252.55002	0.016260216	1080.036	0.036294	869.3188	0.015137
252.88377	0.020191054	1088.558	0.012236	880.035	0.035044
260.00142	0.00142	1100.024	0.023774	881.265	0.011635
276.50627	0.016200176	1114.15	0.019385	887.4125	0.015484
280.00326	0.00326	1115.695	0.015538	900.035	0.035024
281.26877	0.01603287	1119.24	0.010486	920.035	0.035044
291.39919	0.001548188	1119.428	0.010939	923.455	0.028752
292.62502	0.016228243	1120.024	0.023774	926.2375	0.014552
293.23628	47.503806	1124.551	0.010934	940.035	0.035024
293.2363	23.411145	1134.48	0.015989	960.0413	0.041295
300.00457	0.004568	1140.03	0.030044	980.035	0.035044
302.79796	0.000204409	1146.558	0.01058	984.0313	0.015052
303.23114	0.000331222	1147.189	0.01159	985.2663	0.013958
318.63684	0.001107116	1148.323	0.011687	1000.035	0.035024
320.0009	0.0009	1156.759	0.023484	1008.881	0.015671
340.0026	0.0026	1160.024	0.023794	1010.546	0.017351
360.00353	0.00353	1180.024	0.023774	1017.281	0.011398
366.59649	0.000867252	1182.233	0.011812	1020.035	0.035024
369.68993	0.000300057	0.030044	0.030044	1020.169	0.015682
380.002	0.002	8.432524	0.0076	1024.159	0.013223
396.96877	0.015156538	22.75127	0.014732	1040.035	0.035044
400.00071	0.00071	24.42627	0.011819	1060.035	0.035044
420.00081	0.00081	32.52667	0.001798	1070.273	0.016297
423.28339	4.20E-05	40.01754	0.017544	1080.035	0.035044
440.00152	0.00152	44.91377	0.010914	1089.369	0.016659
440.98623	0.001229221	48.18877	0.022124	1091.259	0.012224
448.53993	0.00022292	60.01754	0.017544	1100.035	0.035044
454.60877	0.026490572	70.32877	0.012276	1100.12	0.021883

460.00177	0.00177	78.54502	0.008894	1111.571	0.00935
465.74863	6.00E-05	80.02379	0.023794	1111.804	0.013635
467.43793	4.20E-05	82.90127	0.007977	1113.58	0.024262
472.84252	0.017384125	92.26502	0.020425	1120.035	0.035044
480.00309	0.00309	100.0238	0.023774	1140.035	0.035044
500.00125	0.00125	100.153	0.000618	1140.869	0.011455
501.77117	0.002466405	108.0375	0.021509	1141.72	0.022623
508.13377	0.021239467	113.9638	0.022595	1148.176	0.021924
513.3821	4.20E-05	120.03	0.030044	1148.978	0.011035
515.35469	0.000209739	127.8275	0.011763	1149.7	0.000323
593.17745	73.177454	135.335	0.026699	1152.009	0.008546
593.17761	72.555281	139.3538	0.02415	1153.783	0.000216
593.17791	70.57121	140.0238	0.023794	1156.475	0.014392
593.18183	3.9605347	160.0238	0.023794	1160.035	0.035044
593.18195	71.573942	161.0763	0.010486	1162.506	0.011801
593.18384	6.4444758	180.03	0.030044	1180.035	0.035044
593.18498	9.1460355	183.055	0.016544	1189.209	0.008525
593.18708	51.692419	200.0238	0.023794	1196.574	0.025878
593.18754	14.308499	203.5593	0.000592	8.445024	0.0201
593.18779	5.947886	211.0413	0.026223	20.03504	0.035044
593.19077	8.7951274	216.9138	0.009193	22.75752	0.020982
593.19391	13.19391	218.155	0.017168	24.43127	0.016819
593.19605	33.196051	220.0238	0.023794	32.54877	0.023906
593.19607	53.196071	227.2388	0.013729	40.03502	0.035024
593.1978	45.884888	227.8838	0.014011	44.92627	0.023414
600.00041	0.00041	231.285	0.023591	48.20002	0.033374
608.89807	0.0001729	232.0388	0.01366	60.03502	0.035024
620.00067	0.00067	240.03	0.030044	70.32877	0.012276
626.63195	0.000389112	250.4413	0.010915	78.55002	0.013894
627.08377	0.030187949	251.1963	0.010888	80.03502	0.035024
628.25208	4.20E-05	260.0175	0.017544	82.90627	0.012977
628.97738	0.000809509	262.29	0.016545	92.26502	0.020425
636.8389	0.001386508	280.0175	0.017544	100.035	0.035044
640.00233	0.00233	282.115	0.012585	100.18	0.027613
642.42502	0.024455661	284.9288	0.011105	108.0313	0.015259
649.31142	0.000764857	300.0175	0.017544	113.9563	0.015095
660.00397	0.00397	305.0038	0.015133	120.035	0.035024
662.53377	0.031151692	309.884	0.000189	127.8275	0.011763
680.00295	0.00295	320.0175	0.017544	135.3086	0.000312
690.42362	0.001165767	326.0788	0.026084	139.3301	0.000439
700.00121	0.00121	340.0175	0.017524	140.035	0.035044
705.33469	0.001412872	341.1825	0.01027	160.035	0.035044
706.60502	0.012676217	347.3963	0.012013	161.0813	0.015486
720.00081	0.00081	352.3613	0.013817	180.035	0.035044
721.88127	0.011831664	360.0175	0.017544	200.035	0.035044
760.00119	0.00119	361.84	0.014301	203.5988	0.040095
761.73752	0.015192692	366.3463	0.010757	211.0166	0.001567
764.97127	0.022298964	380.0175	0.017524	216.9188	0.014193

780.00342	0.00342	382.0325	0.017152	220.035	0.035044
783.19002	0.023918756	385.8275	0.015333	227.2375	0.012479
788.41214	4.20E-05	400.0175	0.017544	227.8838	0.014011
799.10002	0.011880171	405.6825	0.009072	231.2616	0.000125
800.00154	0.00154	415.0363	0.024483	232.045	0.01991
816.59377	0.011915708	420.0175	0.017544	240.0351	0.03507
820.00071	0.00071	421.7613	0.012739	250.4413	0.010915
824.3133	0.000195315	426.475	0.029619	251.1963	0.010888
830.07602	0.000169343	427.1236	0.00022	260.035	0.035024
833.58049	0.000378053	440.0175	0.017544	262.2838	0.010295
840.0033	0.0033025	455.4638	0.008848	280.035	0.035024
840.00332	0.0033225	455.8675	0.01348	282.115	0.012585
860.00088	0.00088	457.6312	0.000447	284.9288	0.011105
860.00283	0.002832	460.0238	0.023774	304.9975	0.008883
860.00285	0.002852	461.7438	0.019876	309.9238	0.039945
861.70252	0.021737689	480.0175	0.017544	320.035	0.035044
864.06252	0.026113176	489.4513	0.01654	326.053	0.000281
880.00268	0.00268	492.08	0.011377	340.035	0.035044
895.22224	0.000477273	500.0175	0.017544	341.1875	0.01527
895.97752	0.030607644	508.6425	0.016121	347.3963	0.012013
900.00199	0.00199	520.0238	0.023794	360.0413	0.041274
920.00175	0.00175	537.18	0.016246	361.8338	0.008051
925.60627	0.020817971	546.32	0.016347	366.3463	0.010757
926.82862	0.000562189	558.1263	0.008709	380.035	0.035044
938.58187	0.000250366	560.0238	0.023794	382.0313	0.015902
940.0033	0.0033	560.395	0.00862	385.8275	0.015333
943.87251	0.001102261	561.7238	0.012378	400.035	0.035044
952.87981	0.001979669	566.4613	0.014518	405.6875	0.014072
960.00267	0.00267	571.5363	0.016555	420.0413	0.041294
975.26502	0.022894529	577.7929	0.000862	426.4625	0.017119
979.45877	0.027121021	580.0238	0.023794	427.1613	0.037917
980.00229	0.00229	600.03	0.030044	440.035	0.035024
984.12502	0.013584071	620.0175	0.017524	455.475	0.020098
1000.0029	0.00287	630.5213	0.014613	457.655	0.024273
1003.4313	0.013460647	639.2375	0.019183	460.035	0.035044
1018.8153	4.20E-05	640.0176	0.017545	461.7375	0.013626
1020.0026	0.00262	641.8113	0.015265	480.035	0.035044
1022.6813	0.011976491	649.925	0.023261	489.45	0.01529
1028.0963	0.0296547	651.4575	0.007861	500.035	0.035044
1030.8588	0.020465487	660.0175	0.017524	520.035	0.035044
1040.0028	0.0028	679.6475	0.016201	540.0413	0.041274
1042.1586	0.000304365	680.0175	0.017524	546.3263	0.022597
1052.675	0.013605192	683.11	0.023031	558.1313	0.013709
1060.0022	0.00218	683.355	0.015194	560.035	0.035044
1069.39	0.021518933	691.9263	0.016775	560.4	0.01362
1080.0012	0.00116	700.0113	0.011274	577.8238	0.031743
1100.0012	0.00118	703.9088	0.009765	580.035	0.035044
1118.8635	0.001173963	705.3725	0.010078	620.035	0.035044

1120.0022	0.00224	711.3038	0.013809	630.515	0.008363
1138.8004	0.00034165	712.7513	0.01329	639.2313	0.012933
1140.0012	0.00116	716.65	0.019098	640.035	0.035044
1156.3125	0.012161892	720.0175	0.017544	649.9188	0.017011
1159.6463	0.024014305	723.7913	0.012925	651.4688	0.019111
1160.0017	0.00172	738.8263	0.009564	660.035	0.035044
1175.2113	0.000104551	740.0175	0.017544	679.6413	0.009951
1180.0014	0.00139	740.046	0.000111	680.035	0.035024
1184.2849	0.000323232	751.6075	0.013756	683.0875	0.000455
800.0027	0.0027	752.2663	0.018606	691.9325	0.023025
809.75002	0.010820009	760.0175	0.017544	700.035	0.035044
812.23127	0.024129076	773.0788	0.014478	703.915	0.016015
820.00321	0.00321	780.03	0.030024	705.3725	0.010078
838.87752	0.020641379	785.8325	0.016134	711.3038	0.013809
840.00248	0.00248	798.3413	0.014753	712.75	0.01204
844.57502	0.019209388	800.0175	0.017544	716.6438	0.012848
851.50334	7.98E-05	811.5263	0.011574	723.7913	0.012925
851.53216	0.000389588	820.0175	0.017524	738.8375	0.020814
860.00307	0.00307	825.415	0.013329	740.035	0.035044
865.59377	0.02021506	829.545	0.019037	740.0738	0.027867
880.00355	0.00355	833.8038	0.025198	751.6138	0.020006
880.37752	0.021287821	838.7138	0.017312	752.26	0.012356
880.73955	0.000269838	840.0175	0.017544	760.035	0.035044
883.27156	0.001691756	841.9488	0.013052	773.0788	0.014478
896.93719	0.00113334	851.19	0.017911	780.0413	0.041274
897.43752	0.014759402	860.0175	0.017524	785.8313	0.014884
900.00271	0.00271	876.345	0.011147	798.3413	0.014753
910.58377	0.024207819	880.0238	0.023774	800.035	0.035024
920.00378	0.00378	885.6013	0.015341	811.5313	0.016574
925.45627	0.010893735	895.4063	0.020794	820.035	0.035024
940.00192	0.00192	897.4	0.024428	825.4213	0.019579
941.85002	0.022386881	900.0175	0.017544	829.5375	0.011537
943.19627	0.0207929	903.365	0.01235	833.7874	0.008797
943.85572	0.000907616	905.1124	0.00027	838.72	0.023562
947.20028	0.001042316	909.9788	0.027884	840.035	0.035044
955.18127	0.011443419	916.4825	0.009999	851.1838	0.011661
960.00323	0.00323	920.0175	0.017544	860.035	0.035024
980.0015	0.0015	938.7725	0.014557	876.35	0.016147
980.21492	0.000384732	940.0175	0.017544	880.035	0.035024
983.40083	0.000168268	943.24	0.011876	885.6	0.014091
985.73752	0.014138419	945.7363	0.01713	895.4	0.014544
989.02492	0.001669454	949.9613	0.01307	897.3875	0.011928
993.12444	0.001077789	960.0175	0.017544	900.035	0.035044
993.88211	0.000233824	962.2991	0.000317	903.365	0.01235
994.26127	0.016589359	966.38	0.012199	905.1363	0.024192
1000.0023	0.00227	978.1875	0.019454	909.9513	0.00036
1003.7312	0.007768035	999.095	0.008626	916.495	0.022499
1006.0769	0.000399126	1000.024	0.023774	920.035	0.035044

1015.1443	0.000400154	1020.018	0.017544	938.7725	0.014557
1020.0021	0.00206	1023.684	0.014742	940.035	0.035044
1040.0015	0.00147	1029.488	0.020153	943.24	0.011876
1059.4	0.015252256	1040.024	0.023794	960.035	0.035024
1060.0019	0.00195	1050.427	0.00029	962.3238	0.025006
1063.2089	0.0013132	1060.024	0.023794	978.1813	0.013204
1066.9538	4.20E-05	1069.045	0.013526	980.035	0.035044
1068.0688	0.014471495	1080.036	0.036274	999.1	0.013626
1070.8438	0.01186295	1082.225	0.020337	1000.035	0.035044
1073.4238	0.01643413	1083.938	0.018904	1020.035	0.035044
1078.462	0.000284487	1087.346	0.001592	1023.69	0.020992
1080.0022	0.00216	1089.864	0.008303	1029.481	0.013903
1080.5913	0.001003724	1090.844	0.021124	1040.035	0.035044
1085.6519	4.20E-05	1100.024	0.023794	1050.455	0.02825
1086.5188	0.016021426	1103.151	0.01194	1060.035	0.035044
1095.7088	0.019421628	1110.391	0.012029	1069.051	0.019776
1100.0009	0.00093	1111.285	0.010074	1080.035	0.035044
1120.0017	0.0017	1116.324	0.016867	1082.219	0.014087
1125.375	0.01716248	1117.834	0.009783	1083.931	0.012654
1132.3986	0.00054676	1120.024	0.023794	1087.374	0.029093
1140.0012	0.00116	1127.041	0.027069	1089.883	0.027053
1140.2465	0.001653991	1140.043	0.042524	1090.856	0.033624
1153.6268	0.001210436	1151.354	0.010247	1100.035	0.035044
1160.0029	0.00286	1160.024	0.023794	1103.156	0.01694
1167.69	0.023657576	1161.395	0.019715	1110.391	0.012029
1180.0009	0.00089	1168.758	0.007885	1111.285	0.010074
1181.2753	0.000857148	1180.024	0.023794	1117.834	0.009783
1190.5438	0.021119271	1185.008	0.012945	1127.015	0.000607
1194.175	0.012742632	1185.073	0.02396	1140.035	0.035044
0.026264	0.026264	1196.176	0.016263	1151.354	0.010247
0.028034	0.028034	0.022552	0.022552	1160.035	0.035024
0.66031	0.00031	2.990024	0.025689	1161.395	0.019715
3.63031	0.00031	17.68634	0.000234	1168.763	0.012885
3.96031	0.00031	20.01002	0.010024	1180.035	0.035044
5.61031	0.00031	23.18163	0.000208	1185.013	0.017945
5.94031	0.00031	27.07984	0.000344	1185.05	0.001234
7.26031	0.00031	40.02253	0.022528	1196.175	0.015013
13.86031	0.00031	40.02255	0.022548	0.035024	0.035024
14.52031	0.00031	40.02257	0.022568	0.860024	0.011723
15.51031	0.00031	40.02259	0.022588	13.37532	0.002376
19.80031	0.00031	40.02261	0.022608	20.01004	0.010044
24.09031	0.00031	48.92142	0.000205	36.68968	0.000212
27.06031	0.00031	52.39002	0.009945	60.02902	0.02902
31.02031	0.00031	57.19002	0.00445	63.03252	0.010857
32.34031	0.00031	60.01633	0.016334	67.32877	0.012903
33.99031	0.00031	62.25016	0.007049	77.78456	0.000814
40.26031	0.00031	62.65877	0.011423	80.02254	0.022544
41.25031	0.00031	69.80865	0.000365	90.12502	0.017002

41.58031	0.00031	70.90883	0.001263	100.0163	0.016322
42.90031	0.00031	76.71627	0.040938	101.2558	0.000834
43.56031	0.00031	80.02256	0.022564	120.0226	0.022564
43.89031	0.00031	100.0163	0.016294	140.0163	0.016302
45.21031	0.00031	109.3598	0.000799	144.7077	0.000926
46.53031	0.00031	117.4177	0.001467	151.7788	0.01024
52.47031	0.00031	120.0226	0.022568	160.0226	0.022564
55.77031	0.00031	130.9975	0.013923	161.3884	0.000388
57.42031	0.00031	135.3913	0.01153	161.9371	0.000283
60.02567	0.02567	146.3424	0.000395	180.0225	0.022544
64.02031	0.00031	147.5775	0.025181	186.0613	0.039831
66.00031	0.00031	154.8151	0.00016	197.7833	0.000307
67.98031	0.00031	160.0163	0.016282	200.0163	0.016306
71.94031	0.00031	162.4758	0.000203	208.3345	0.000401
74.25031	0.00031	164.7786	0.001469	220.0226	0.02262
76.23031	0.00031	174.0972	0.000438	240.0226	0.022564
79.86031	0.00031	174.6288	0.037893	241.8559	0.000127
80.020184	0.020184	175.0911	0.000155	243.249	0.000395
82.50031	0.00031	178.2313	0.014035	246.1558	0.000147
88.44031	0.00031	180.0226	0.022548	248.6386	0.00041
90.42031	0.00031	193.4808	0.000779	260.01	0.010044
95.37031	0.00031	194.6288	0.038331	270.4973	0.000583
98.34031	0.00031	200.0226	0.022564	271.8499	0.000388
102.30031	0.00031	209.1649	0.000333	280.0226	0.02262
103.62031	0.00031	212.6475	0.013873	300.01	0.010028
103.95031	0.00031	215.4925	0.0002	320.0101	0.010064
104.28031	0.00031	215.6275	0.022902	322.595	0.022945
106.92031	0.00031	215.9794	0.000402	336.72	0.024301
108.57031	0.00031	220.0163	0.016294	340.0101	0.010048
108.90031	0.00031	223.4875	0.000275	345.0907	0.000777
113.85031	0.00031	224.165	0.013056	345.145	0.010695
114.18031	0.00031	239.1316	0.000585	346.6188	0.011185
120.02145	0.021454	240.0288	0.028826	354.0385	0.000342
123.75031	0.00031	240.035	0.035024	360.0289	0.028895
127.05031	0.00031	240.035	0.035044	369.67	0.00028
128.04031	0.00031	240.0351	0.035064	377.8678	0.000361
138.27031	0.00031	240.0351	0.035084	380.0163	0.016294
140.25031	0.00031	244.9088	0.001406	384.7937	0.002095
140.91031	0.00031	245.082	0.00027	400.01	0.010044
142.89031	0.00031	252.2918	0.001526	409.6525	0.013897
144.87031	0.00031	253.3075	0.000404	420.0101	0.010048
152.13031	0.00031	260.01	0.010044	440.0163	0.016294
160.01235	0.012354	263.1788	0.015017	460.01	0.010044
161.04031	0.00031	272.9576	0.00126	461.2707	0.000188
165.33031	0.00031	278.6925	0.02614	465.5925	0.000189
168.30031	0.00031	280.0225	0.022524	478.6983	0.000968
175.56031	0.00031	280.0225	0.022544	480.01	0.010028
179.52031	0.00031	283.3975	0.011319	483.931	0.000415

180.03637	0.03637	287.56	0.011132	487.5881	0.00019
181.83031	0.00031	290.758	0.001564	496.8032	0.000439
182.82031	0.00031	300.0163	0.016286	500.01	0.010044
186.45031	0.00031	300.0213	0.026045	502.9713	0.011835
191.40031	0.00031	318.9189	0.000145	504.165	0.011187
196.68031	0.00031	320.0101	0.010064	506.2474	0.000277
203.94031	0.00031	329.5188	0.012574	509.9557	0.000372
211.86031	0.00031	332.8145	0.000293	511.0761	0.001133
212.85031	0.00031	340.01	0.010024	520.0163	0.016302
214.50031	0.00031	341.1666	0.001458	520.525	0.013933
216.15031	0.00031	349.017	0.000164	533.3575	0.008423
220.77031	0.00031	360.0288	0.028822	540.0226	0.022552
224.73031	0.00031	367.3072	0.000365	541.5174	0.0012
226.38031	0.00031	367.3588	0.036916	550.3177	0.001085
228.69031	0.00031	368.923	0.000343	551.0863	0.028524
232.98031	0.00031	380.0163	0.016298	557.8388	0.024217
233.31031	0.00031	382.6938	0.016002	560.0163	0.016306
234.30031	0.00031	388.4508	6.00E-05	567.9625	0.000305
235.29031	0.00031	389.0481	0.001533	570.6835	0.000353
238.26031	0.00031	389.4275	0.021971	580.0225	0.022544
238.59031	0.00031	397.43	0.026982	583.0438	0.035301
240.02567	0.025674	400.0163	0.01629	600.0225	0.022544
240.02771	0.027714	420.0226	0.022548	607.4079	0.000356
240.57031	0.00031	439.3058	0.00086	620.0101	0.010064
242.55031	0.00031	440.01	0.010044	626.3463	0.010084
247.83031	0.00031	451.2399	0.000237	640.0163	0.016274
250.14031	0.00031	460.0101	0.010048	647.11	0.015274
251.46031	0.00031	461.4453	0.001199	658.5038	0.016229
254.43031	0.00031	463.7824	0.000888	660.0101	0.010064
258.39031	0.00031	466.4409	0.000684	663.4663	0.000457
260.04031	0.00031	478.2448	0.000229	674.02	0.00094
261.03031	0.00031	478.6125	0.012341	674.2043	0.0003
265.32031	0.00031	480.0288	0.028786	680.0101	0.010048
267.63031	0.00031	500.01	0.010044	691.6446	0.000175
274.89031	0.00031	505.1398	0.000714	693.3186	0.000179
276.21031	0.00031	509.5759	0.000881	720.0101	0.010068
278.19031	0.00031	515.2448	0.000232	723.9745	0.001267
279.84031	0.00031	520.0226	0.022564	726.8351	4.20E-05
282.81031	0.00031	523.1887	0.000372	740.01	0.010044
284.79031	0.00031	540.0288	0.028818	757.3325	0.023751
286.11031	0.00031	546.5143	0.008252	760.0101	0.010048
286.44031	0.00031	548.3375	0.016534	763.6658	0.000343
291.06031	0.00031	556.2006	0.000438	780.0101	0.010048
291.39031	0.00031	560.0163	0.016302	794.776	0.000407
291.72031	0.00031	566.735	0.038245	797.8271	0.000447
292.05031	0.00031	572.7977	0.000315	800.0163	0.016294
295.35031	0.00031	580.0163	0.016282	801.0413	0.001107
296.01031	0.00031	580.1369	0.000481	813.1514	4.20E-05



298.65031	0.00031	593.6913	0.010535	820.0101	0.010068
299.97031	0.00031	600.0226	0.022548	835.2278	0.000208
300.03127	0.031274	609.0177	0.001315	837.2951	0.000436
303.93031	0.00031	613.7557	0.000216	840.0101	0.010064
310.20031	0.00031	614.9875	0.019115	843.6911	6.00E-05
314.16031	0.00031	615.2145	0.000785	846.8583	0.00049
314.82031	0.00031	616.2592	0.000307	860.0163	0.016274
320.02002	0.020024	620.0163	0.016278	869.5923	0.000931
320.76031	0.00031	621.4559	6.00E-05	877.3432	0.001317
321.09031	0.00031	625.815	0.023154	879.9603	0.000653
323.07031	0.00031	626.1279	0.004917	900.0101	0.010048
323.73031	0.00031	640.0163	0.01632	906.5677	0.001823
327.03031	0.00031	642.115	0.014207	910.8343	0.000284
330.33031	0.00031	648.557	0.001756	917.2213	0.014977
330.99031	0.00031	657.1904	0.000969	920.0226	0.02262
340.23031	0.00031	660.0164	0.01635	927.4888	0.013774
345.18031	0.00031	665.7483	0.000163	937.2507	0.001752
346.17031	0.00031	670.8175	0.026499	940.0163	0.016294
352.11031	0.00031	679.6775	0.022279	947.0525	0.012095
353.10031	0.00031	680.01	0.010028	949.195	0.025194
355.41031	0.00031	682.1863	0.02779	952.3825	0.009611
355.74031	0.00031	697.785	0.011636	958.87	0.008874
360.02413	0.02413	699.2289	0.001439	960.0101	0.010048
364.32031	0.00031	700.0101	0.010064	961.864	0.000833
364.98031	0.00031	714.5213	0.013023	965.25	0.000364
366.96031	0.00031	718.7775	0.011509	978.8538	0.013495
373.89031	0.00031	720.0163	0.016286	980.0163	0.016274
379.50031	0.00031	723.4245	0.000975	980.2698	0.0002
388.41031	0.00031	724.0938	0.011915	985.136	0.001132
391.38031	0.00031	725.0365	0.000877	1000.01	0.010044
395.34031	0.00031	727.5578	0.001431	1000.772	0.001399
399.30031	0.00031	730.665	0.014713	1007.864	0.000547
400.01959	0.01959	740.8275	0.001772	1010.036	0.000425
403.26031	0.00031	758.5717	0.000282	1010.959	0.000523
405.24031	0.00031	760.01	0.010024	1014.571	0.016456
405.90031	0.00031	764.285	0.041244	1017.308	0.022399
407.55031	0.00031	769.285	0.011596	1020.01	0.010044
409.53031	0.00031	773.829	0.001197	1029.075	0.012718
410.52031	0.00031	774.1434	0.000222	1036.684	0.013129
412.50031	0.00031	780.0163	0.01629	1040.016	0.016306
412.83031	0.00031	797.1758	0.00022	1041.376	0.001351
415.47031	0.00031	800.0225	0.022524	1051.556	0.001362
416.79031	0.00031	820.0163	0.016326	1060.016	0.016302
418.44031	0.00031	823.1693	0.000492	1060.706	0.001411
419.76031	0.00031	824.1707	0.000974	1071.376	0.000142
420.04004	0.040044	828.8367	0.000534	1080.029	0.028794
422.40031	0.00031	829.6272	0.000449	1100.016	0.01631
426.36031	0.00031	829.9243	0.000621	1120.023	0.022564

426.69031	0.00031	840.0163	0.016298	1137.309	0.01294
427.68031	0.00031	843.5269	0.002213	1154.813	0.03505
434.61031	0.00031	844.4758	0.000697	1160.016	0.016298
434.94031	0.00031	860.0163	0.016282	1173.731	0.001046
440.88031	0.00031	860.0625	0.012221	1180.016	0.01631
447.81031	0.00031	869.7891	4.20E-05	1184.454	0.019537
451.77031	0.00031	878.3383	0.000355	0.022584	0.022584
455.73031	0.00031	879.2161	0.000328	13.58626	0.001695
456.72031	0.00031	880.0163	0.016314	20.01002	0.010024
464.64031	0.00031	900.0163	0.016306	23.30461	0.000795
465.30031	0.00031	911.756	0.000425	23.76377	0.011722
466.29031	0.00031	920.0225	0.022524	40.01005	0.010048
467.28031	0.00031	925.4413	0.010292	45.09358	0.001435
467.94031	0.00031	938.7588	0.024261	60.01003	0.010028
469.59031	0.00031	940.01	0.010028	60.89377	0.015766
476.52031	0.00031	948.1846	0.000758	63.48107	0.000541
476.85031	0.00031	960.0163	0.01633	80.02258	0.022584
477.51031	0.00031	976.8291	0.001386	86.31127	0.025736
480.02575	0.02575	980.01	0.010024	100.0163	0.016282
480.04002	0.040024	995.51	0.040052	105.0254	0.000481
481.80031	0.00031	1000.01	0.010084	120.035	0.035036
482.79031	0.00031	1013.442	6.00E-05	120.0351	0.035056
483.78031	0.00031	1015.66	0.000229	120.0351	0.035076
484.77031	0.00031	1020.016	0.016318	120.0351	0.035096
488.40031	0.00031	1027.043	0.007025	120.0351	0.035116
488.73031	0.00031	1040.016	0.016278	121.5938	0.012097
489.06031	0.00031	1052.194	0.013595	123.225	0.001042
495.00031	0.00031	1060.023	0.022524	134.6488	0.028269
498.30031	0.00031	1063.584	0.015287	139.3825	0.029473
511.83031	0.00031	1069.562	0.000851	140.0229	0.02292
516.12031	0.00031	1080.035	0.035095	140.9361	0.007846
524.37031	0.00031	1090.66	0.038711	147.4088	0.01085
524.70031	0.00031	1100.023	0.022544	158.9225	0.010565
527.67031	0.00031	1120.023	0.022544	160.0163	0.016306
532.29031	0.00031	1131.246	0.003858	180.0226	0.022584
534.60031	0.00031	1132.536	0.02778	182.2059	0.001371
535.92031	0.00031	1136.493	0.034809	182.8283	0.000773
540.02272	0.022724	1140.023	0.022576	198.8685	0.000137
542.52031	0.00031	1151.248	0.000322	200.0226	0.022564
542.85031	0.00031	1160.023	0.022564	220.0163	0.016286
545.49031	0.00031	1180.016	0.016314	233.3391	0.000924
546.15031	0.00031	1191.36	0.000941	234.3821	0.000366
548.79031	0.00031	0.022592	0.022592	240.0225	0.022524
552.09031	0.00031	1.536274	0.027072	242.4875	0.013515
552.75031	0.00031	10.16568	4.20E-05	245.9313	0.015063
555.06031	0.00031	14.61596	0.001606	254.4296	0.000409
559.68031	0.00031	19.56385	0.001256	260.01	0.010024
563.64031	0.00031	20.01628	0.016278	280.0101	0.010086

566.94031	0.00031	40.01005	0.010048	281.0763	0.01244
571.23031	0.00031	43.1602	0.000181	281.9288	0.01211
571.89031	0.00031	60.01636	0.016356	300.0163	0.016274
572.55031	0.00031	76.33594	0.000423	306.955	0.038803
573.21031	0.00031	77.64975	0.000269	320.01	0.010024
574.53031	0.00031	80.01631	0.016306	340.0101	0.010048
581.13031	0.00031	82.94002	0.010435	345.1577	0.000557
585.09031	0.00031	83.03502	0.037989	360.01	0.010044
587.73031	0.00031	83.06752	0.02396	362.0223	0.001508
592.68031	0.00031	100.0226	0.022548	378.1178	0.000678
594.33031	0.00031	125.615	0.013687	378.5911	0.000475
597.30031	0.00031	131.755	0.024261	399.2704	0.001067
600.01458	0.014584	133.0426	0.000174	399.9513	0.011787
600.93031	0.00031	140.0163	0.016318	400.0227	0.02267
601.59031	0.00031	158.4213	0.001567	415.6389	0.000437
602.25031	0.00031	160.0225	0.022544	420.035	0.03504
606.54031	0.00031	177.0422	0.001189	440.01	0.010024
608.19031	0.00031	180.0226	0.022548	464.8013	0.013623
609.18031	0.00031	181.7938	0.016383	472.0625	0.011334
615.78031	0.00031	182.0625	0.015416	477.2813	0.013512
617.10031	0.00031	190.9065	0.001045	480.0163	0.016306
623.04031	0.00031	193.5115	0.001216	484.8768	0.002058
625.02031	0.00031	196.5535	0.001531	498.7294	0.000213
627.99031	0.00031	200.0226	0.022564	500.0225	0.02254
631.29031	0.00031	207.18	0.027765	511.4444	0.001501
632.28031	0.00031	218.8074	0.000209	514.475	0.011703
632.94031	0.00031	220.0163	0.016314	520.0163	0.016282
635.91031	0.00031	236.51	0.02248	529.0263	0.011095
640.02502	0.025024	240.0226	0.022572	540.0226	0.022552
645.48031	0.00031	244.1004	0.000567	553.7013	0.025442
645.81031	0.00031	268.6688	0.013	557.17	0.020434
646.14031	0.00031	280.0101	0.010088	560.0163	0.016286
646.80031	0.00031	300.0163	0.016326	580.0226	0.022564
647.79031	0.00031	320.0163	0.016314	583.3447	0.001139
651.09031	0.00031	323.75	0.01436	585.4689	6.52E-05
660.01888	0.01888	327.665	0.010423	593.19	43.07815
660.33031	0.00031	330.6364	0.001352	597.8813	0.035936
661.98031	0.00031	334.7477	0.000248	600.0225	0.022524
668.58031	0.00031	340.01	0.010044	603.9813	0.033591
668.91031	0.00031	348.5233	0.000359	608.485	0.013483
670.56031	0.00031	360.0163	0.016294	620.01	0.010024
673.53031	0.00031	360.5178	6.00E-05	625.4063	0.034783
677.16031	0.00031	371.6675	0.040917	634.6165	0.000616
678.15031	0.00031	373.9563	0.015465	635.314	0.001137
683.43031	0.00031	377.7125	0.013801	640.0101	0.010064
686.07031	0.00031	380.0101	0.010064	640.5641	0.000501
686.73031	0.00031	386.2878	0.001883	642.0285	0.001713
687.39031	0.00031	392.7047	0.00033	652.4827	0.000661

689.04031	0.00031	397.9808	0.000967	658.0638	0.008291
691.02031	0.00031	400.0101	0.010064	658.6325	0.021083
691.35031	0.00031	409.6923	0.000362	660.01	0.010024
702.24031	0.00031	414.3188	0.017446	667.405	0.028269
706.86031	0.00031	420.0163	0.016314	680.0226	0.02257
708.84031	0.00031	433.1412	0.000364	687.7164	0.000159
709.17031	0.00031	433.8451	0.000278	700.01	0.010024
710.16031	0.00031	441.8	0.008561	713.3743	0.000153
711.48031	0.00031	442.9538	0.001395	716.9075	0.009431
718.74031	0.00031	448.2838	0.022866	719.4075	0.012016
719.07031	0.00031	449.0724	0.001536	719.7063	0.014044
719.40031	0.00031	460.0101	0.010088	721.42	0.01978
719.73031	0.00031	466.308	0.000235	732.2309	0.009228
720.02654	0.02654	472.7938	0.014221	733.4927	0.001463
720.03254	0.032544	474.3213	0.012984	740.0163	0.016274
724.02031	0.00031	480.0164	0.01642	746.3052	0.000397
725.34031	0.00031	500.0163	0.016318	755.4963	0.010917
727.65031	0.00031	516.4614	0.000307	760.0163	0.016294
730.95031	0.00031	518.8996	0.000252	780.0225	0.022524
732.60031	0.00031	519.335	0.036798	783.3811	0.000214
741.18031	0.00031	520.0163	0.016294	792.9586	0.001635
742.83031	0.00031	520.0502	0.001416	797.4922	0.00083
746.46031	0.00031	528.2264	0.000761	802.4738	0.024197
746.79031	0.00031	534.385	0.016053	819.4813	0.015785
751.74031	0.00031	536.5088	0.002107	820.0101	0.010068
752.73031	0.00031	540.0226	0.022548	828.335	0.015499
753.72031	0.00031	560.0225	0.022544	840.01	0.010024
754.05031	0.00031	580.0225	0.022544	847.6328	0.0002
765.93031	0.00031	592.8132	0.000239	860.0101	0.010068
767.25031	0.00031	600.035	0.035024	865.3531	0.000195
768.24031	0.00031	604.1361	0.000329	874.9394	0.000818
770.55031	0.00031	608.3663	0.013197	880.0163	0.016294
771.87031	0.00031	620.01	0.010044	885.725	0.016214
773.19031	0.00031	631.2275	0.025557	886.9688	0.01213
776.16031	0.00031	635.7175	0.038461	900.029	0.028945
776.49031	0.00031	640.0166	0.01657	902.4	0.000948
780.03071	0.03071	642.7573	0.000788	903.9863	0.023777
781.44031	0.00031	656.466	0.001854	920.0101	0.010064
784.41031	0.00031	660.0163	0.01633	940.0163	0.016274
788.04031	0.00031	667.5938	0.015993	943.9363	0.027108
793.65031	0.00031	677.1101	0.001024	949.9363	0.026977
794.97031	0.00031	677.744	0.000507	957.8254	4.20E-05
795.63031	0.00031	680.0101	0.010068	960.0163	0.016314
796.95031	0.00031	683.6125	0.015987	980.01	0.010024
800.01307	0.01307	686.8288	0.000614	983.4563	0.037006
800.91031	0.00031	700.01	0.010044	1000.01	0.010024
803.55031	0.00031	702.3133	0.000296	1006.245	0.032051
813.45031	0.00031	708.8224	0.000862	1006.894	0.000239

816.75031	0.00031	720.0163	0.016326	1020.01	0.010024
825.99031	0.00031	720.2962	0.000169	1027.669	0.015673
826.32031	0.00031	721.2813	0.017015	1030.201	0.025629
828.63031	0.00031	736.155	0.028734	1040.016	0.016286
833.91031	0.00031	740.0101	0.010064	1051.904	0.00409
837.54031	0.00031	744.7854	0.00113	1055.695	0.000834
838.53031	0.00031	744.9376	0.000223	1060.016	0.016322
838.86031	0.00031	749.2188	0.013313	1062.658	0.011445
840.03132	0.03132	752.9813	0.011333	1080.023	0.022564
840.84031	0.00031	755.475	0.011712	1086.653	0.001031
847.11031	0.00031	760.0164	0.01635	1089.786	0.029575
849.75031	0.00031	800.0163	0.016314	1097.803	0.010099
851.07031	0.00031	811.0163	0.036036	1100.023	0.022584
856.35031	0.00031	817.8363	0.035217	1120.016	0.016286
856.68031	0.00031	820.01	0.010044	1123.623	0.00137
868.89031	0.00031	840.0163	0.016318	1127.901	0.010712
871.20031	0.00031	841.86	0.015715	1140.029	0.028782
878.79031	0.00031	845.1338	0.010635	1154.419	0.001541
880.01832	0.01832	858.6	0.015259	1160.016	0.016278
881.76031	0.00031	859.8725	0.015553	1176.697	0.000869
886.05031	0.00031	860.0163	0.016322	1180.023	0.02257
887.37031	0.00031	870.4007	0.000505	1181.889	0.001004
900.03252	0.032524	880.0101	0.010064	1196.92	0.021085
902.55031	0.00031	883.841	0.001572	1197.144	0.032601
904.86031	0.00031	883.882	0.000185	9.139912	0.000219
907.50031	0.00031	892.9551	0.000171	13.47078	0.001103
910.80031	0.00031	900.0288	0.028802	20.01008	0.010084
920.37031	0.00031	904.1725	0.036515	29.19365	0.000174
934.89031	0.00031	905.7195	0.001297	30.44752	0.01567
940.83031	0.00031	908.8375	0.01327	33.52002	0.009904
945.45031	0.00031	914.2463	0.027181	34.60502	0.024061
950.40031	0.00031	917.1875	0.011429	40.01627	0.016274
950.73031	0.00031	919.5711	0.000389	58.70964	0.000235
955.35031	0.00031	920.01	0.010044	60.01628	0.016278
957.00031	0.00031	921.812	0.000487	80.02258	0.022584
957.66031	0.00031	926.3433	0.000939	92.81029	0.002007
960.02779	0.02779	930.2318	0.000603	96.81377	0.015717
960.03127	0.031274	940.0163	0.016286	100.0226	0.022584
960.63031	0.00031	953.5413	0.036453	104.742	6.00E-05
964.92031	0.00031	959.1025	0.026189	105.6813	0.000316
965.58031	0.00031	960.0164	0.01635	120.0226	0.022584
972.84031	0.00031	966.9199	0.001274	120.0288	0.028794
974.49031	0.00031	969.7125	0.01546	120.0351	0.035076
974.82031	0.00031	980.0101	0.010084	120.0351	0.035096
975.15031	0.00031	988.2738	0.000398	120.0351	0.035116
976.80031	0.00031	994.5032	0.000745	120.0351	0.035136
980.76031	0.00031	997.3956	0.000259	127.5238	0.024644
982.08031	0.00031	1000.01	0.010064	131.1443	0.000329

985.71031	0.00031	1000.093	0.000244	138.6175	0.000179
986.04031	0.00031	1003.948	0.001334	140.0163	0.016322
986.37031	0.00031	1010.669	0.012599	152.5388	0.017444
987.36031	0.00031	1020.016	0.016318	160.0226	0.022584
999.90031	0.00031	1028.894	0.01338	174.395	0.008412
1000.5603	0.00031	1030.515	0.024172	177.2595	0.000896
1001.2203	0.00031	1040.016	0.016318	180.0226	0.022584
1003.8603	0.00031	1051.294	0.000764	182.8998	0.001091
1013.1003	0.00031	1052.525	0.012647	188.9332	0.001053
1016.0703	0.00031	1060.016	0.016338	189.43	0.025791
1017.3903	0.00031	1064.012	0.001658	191.7489	0.001189
1017.7203	0.00031	1080.023	0.02297	192.6486	0.000466
1018.3803	0.00031	1086.852	0.000725	198.2013	0.020773
1019.0403	0.00031	1087.746	4.20E-05	200.0225	0.022544
1020.0182	0.01815	1100.023	0.022544	207.5436	0.000751
1023.6603	0.00031	1109.951	0.001856	214.3252	0.001369
1026.3003	0.00031	1119.56	0.007104	219.0875	0.016012
1030.5903	0.00031	1120.023	0.022564	220.0227	0.02272
1040.0171	0.017124	1128.84	0.000422	220.8531	0.000342
1040.4903	0.00031	1132.631	0.022402	222.2052	0.000262
1042.4703	0.00031	1137.213	0.013858	230.6339	0.000705
1051.3803	0.00031	1140.023	0.022576	240.0226	0.022604
1056.9903	0.00031	1149.534	0.000739	243.93	0.02831
1061.6103	0.00031	1152.351	0.001377	246.9513	0.009915
1061.9403	0.00031	1168.754	0.013227	253.2344	0.00027
1065.2403	0.00031	1174.018	0.000353	255.298	0.000552
1065.5703	0.00031	1180.016	0.016314	260.0101	0.010066
1069.5303	0.00031	1195.525	0.001463	263.985	0.014714
1070.5203	0.00031	1195.681	0.017255	280.0163	0.016274
1070.8503	0.00031	0.028802	0.028802	289.3093	0.000608
1072.1703	0.00031	8.285499	0.000165	295.5688	0.013254
1073.8203	0.00031	13.47727	0.001929	300.0101	0.010048
1075.1403	0.00031	16.29377	0.015044	309.5613	0.026526
1077.1203	0.00031	37.32383	0.001471	309.9066	0.001343
1080.03	0.029964	40.01631	0.016314	311.0938	0.01336
1083.7203	0.00031	44.21127	0.025585	320.0101	0.010084
1084.0503	0.00031	53.38275	0.00029	322.7461	0.000382
1087.6803	0.00031	60.02879	0.02879	324.6157	0.001254
1088.3403	0.00031	66.29377	0.013776	337.3625	0.016052
1092.3003	0.00031	74.23759	4.20E-05	340.0101	0.010088
1092.6303	0.00031	80.02254	0.022544	360.0101	0.010084
1093.6203	0.00031	83.51615	4.20E-05	362.8825	0.008867
1097.2503	0.00031	83.68978	0.000372	377.8887	0.000478
1097.9103	0.00031	91.60934	0.007219	380.0163	0.016294
1099.5603	0.00031	100.0163	0.016274	380.8013	0.024233
1102.5303	0.00031	104.9832	0.000746	389.2747	0.011761
1105.5003	0.00031	108.8373	0.000376	400.0101	0.010066
1109.7903	0.00031	113.5975	0.039116	420.0163	0.016294

1117.0503	0.00031	120.0225	0.022528	425.4047	0.000521
1120.0139	0.013898	123.4113	0.023834	440.0101	0.010064
1122.6603	0.00031	140.0225	0.022544	441.62	0.011784
1122.9903	0.00031	144.7496	0.000911	450.6369	0.000184
1127.2803	0.00031	146.4331	0.000464	460.0101	0.010064
1130.2503	0.00031	155.4964	0.000376	476.2675	0.046404
1135.5303	0.00031	160.0226	0.022584	480.0101	0.010088
1137.1803	0.00031	160.1563	0.000186	494.3841	0.000343
1140.029	0.028954	170.3563	0.011337	500.0163	0.016294
1142.1303	0.00031	180.0225	0.022528	512.2182	0.004993
1142.4603	0.00031	190.6012	4.20E-05	520.0226	0.02257
1145.7603	0.00031	195.8025	0.024713	540.0226	0.022572
1146.4203	0.00031	199.3463	0.021388	560.0163	0.016326
1150.7103	0.00031	200.0163	0.016274	569.4125	0.010816
1157.6403	0.00031	204.1693	0.000689	578.575	0.015066
1161.6003	0.00031	204.2308	0.000654	579.5825	0.038346
1163.2503	0.00031	218.535	0.035987	580.0226	0.022584
1167.5403	0.00031	220.0226	0.022556	589.595	0.011351
1168.8603	0.00031	235.4163	0.01224	591.9997	0.000952
1170.5103	0.00031	240.0225	0.022532	600.0226	0.022564
1176.7803	0.00031	241.4625	0.012606	601.0401	0.001185
1178.4303	0.00031	243.1535	0.001365	609.56	0.011752
1184.0403	0.00031	246.75	0.012513	615.659	0.000362
1184.7003	0.00031	251.7605	0.000167	620.0101	0.010104
1185.6903	0.00031	255.5625	0.014087	620.1743	0.000452
1196.9103	0.00031	257.3438	0.015669	640.0226	0.02257
1190.3103	0.00031	260.0101	0.010084	647.7425	0.025386
1191.6303	0.00031	266.1678	0.000415	654.7677	0.003669
0.00031	0.00031	278.6479	0.000448	658.4713	0.01145
0.016684	0.016684	279.2796	0.001124	660.0225	0.022524
0.019974	0.019974	280.3225	0.015072	667.3063	0.036571
1.65031	0.00031	280.765	0.01144	671.5182	0.001008
3.30031	0.00031	288.9631	0.000197	678.7138	0.030742
6.27031	0.00031	298.8038	0.015638	679.5386	0.000661
8.91031	0.00031	300.0225	0.022544	680.0226	0.02262
10.23031	0.00031	320.01	0.010044	700.01	0.010044
10.89031	0.00031	335.478	0.000532	711.3746	0.000408
18.81031	0.00031	337.897	0.00033	715.2831	0.001367
21.45031	0.00031	340.0163	0.01633	717.6921	0.000143
23.10031	0.00031	342.0085	0.000782	720.0101	0.010048
23.76031	0.00031	360.0164	0.016354	740.0101	0.010084
24.42031	0.00031	360.0288	0.038575	749.345	0.021173
27.72031	0.00031	369.8536	0.001508	760.0101	0.010068
36.30031	0.00031	377.8416	0.000709	778.2686	0.000307
40.59031	0.00031	380.01	0.010024	789.6313	0.048169
48.18031	0.00031	395.2275	0.014448	800.0101	0.010084
50.82031	0.00031	400.01	0.010044	802.6825	0.021178
51.15031	0.00031	405.4125	0.013269	809.0883	0.001217

52.14031	0.00031	427.3208	0.001146	812.9593	0.000211
53.46031	0.00031	440.01	0.010024	820.0101	0.010048
58.41031	0.00031	442.2539	0.001148	832.4981	0.000357
60.031274	0.031274	458.7657	0.005638	839.617	0.000197
60.06031	0.00031	459.2662	0.003168	840.0101	0.010084
65.67031	0.00031	460.0101	0.010108	842.6589	0.000477
68.97031	0.00031	477.8813	0.016161	851.6791	0.002212
70.95031	0.00031	477.8935	0.001259	852.3175	0.027886
80.020454	0.020454	480.0225	0.022532	854.2825	0.023749
80.85031	0.00031	500.01	0.010024	857.3408	0.000565
81.18031	0.00031	500.4813	0.00031	860.01	0.010028
87.45031	0.00031	506.1963	0.012433	872.5997	0.001434
89.43031	0.00031	516.4175	0.029107	880.0226	0.02257
100.98031	0.00031	520.0163	0.016294	893.7809	0.000445
101.31031	0.00031	520.5207	0.000318	900.0163	0.016294
104.61031	0.00031	523.3288	0.014983	915.5983	0.001088
116.49031	0.00031	539.7475	0.035093	920.0163	0.016274
117.81031	0.00031	540.0225	0.022528	926.4188	0.015186
120.02953	0.029534	543.0295	0.000105	940.0101	0.010084
122.10031	0.00031	545.2582	0.00051	949.8313	0.010295
133.32031	0.00031	546.8484	0.001187	949.8609	0.000154
135.96031	0.00031	560.0226	0.022584	960.0163	0.016334
136.95031	0.00031	580.0225	0.022544	977.5786	0.000535
137.94031	0.00031	580.5938	0.016321	980.0163	0.016314
140.58031	0.00031	580.7105	0.00039	1000.016	0.016294
142.56031	0.00031	600.0225	0.022528	1008.257	0.000328
143.55031	0.00031	610.5117	0.000318	1020.035	0.035024
151.80031	0.00031	619.1557	0.000297	1035.888	0.000246
160.00908	0.009084	620.01	0.010024	1040.023	0.022524
162.03031	0.00031	633.8025	0.012324	1043.433	0.025022
162.69031	0.00031	640.0225	0.022524	1060.023	0.02262
163.35031	0.00031	641.2788	0.011652	1070.925	0.000796
165.99031	0.00031	654.248	0.001086	1079.9	0.033756
166.65031	0.00031	660.01	0.010028	1080.023	0.022584
172.26031	0.00031	669.9488	0.024211	1091.991	0.016133
176.22031	0.00031	675.8	0.013513	1092.994	0.015687
178.20031	0.00031	680.0101	0.010108	1100.023	0.022564
179.85031	0.00031	688.801	0.000315	1107.111	0.000297
180.02574	0.025744	699.1055	0.000225	1120.023	0.022584
184.47031	0.00031	700.0101	0.010084	1125.185	0.01596
186.78031	0.00031	707.425	0.011839	1125.673	0.000314
187.44031	0.00031	709.6424	0.000519	1128.87	0.014457
190.74031	0.00031	719.9474	0.000813	1135.673	0.000356
196.35031	0.00031	720.01	0.010028	1140.023	0.022564
197.01031	0.00031	733.4328	0.000176	1142.979	0.000412
199.98031	0.00031	739.4775	0.011655	1160.023	0.022584
201.30031	0.00031	740.01	0.010024	1171.001	0.010972
206.58031	0.00031	746.0752	0.000932	1171.503	0.000541



209.55031	0.00031	746.69	0.0223	1180.023	0.02262
210.21031	0.00031	760.0163	0.01631	0.030028	0.030028
215.49031	0.00031	771.7216	0.000325	7.318985	0.001388
217.14031	0.00031	774.6288	0.036799	10.20503	0.017304
222.42031	0.00031	780.01	0.010028	20.01752	0.017524
223.08031	0.00031	783.8568	0.000401	23.31696	0.000763
236.94031	0.00031	808.5605	0.001494	30.51823	0.001356
237.27031	0.00031	818.5935	4.20E-05	33.39878	0.027316
239.25031	0.00031	820.01	0.010024	39.83331	0.000481
239.91031	0.00031	827.255	0.04207	40.01755	0.017548
240.02178	0.021784	827.285	0.037254	50.46752	0.022952
240.02536	0.025364	840.0226	0.022564	51.50503	0.024818
240.24031	0.00031	840.7632	0.000507	60.01754	0.017544
243.54031	0.00031	844.675	0.014795	71.48003	0.029349
244.86031	0.00031	849.7627	0.000387	74.34253	0.01672
250.47031	0.00031	860.01	0.010024	77.23628	0.028865
253.11031	0.00031	865.5835	0.000548	80.02379	0.023786
254.76031	0.00031	880.0225	0.022528	81.32206	0.000782
256.41031	0.00031	886.8119	0.000362	96.0831	0.001679
256.74031	0.00031	900.0225	0.022544	100.0238	0.023798
262.02031	0.00031	908.0563	0.014645	110.7425	0.024124
264.99031	0.00031	919.0752	0.001686	120.03	0.030044
265.65031	0.00031	920.0225	0.022544	120.5215	0.000353
268.62031	0.00031	947.6687	0.00047	121.3971	0.001486
270.60031	0.00031	950.3232	0.001545	123.0113	0.028816
275.55031	0.00031	958.4073	0.000757	133.4725	0.000801
281.82031	0.00031	960.0164	0.01639	140.0238	0.023794
282.15031	0.00031	970.747	0.000723	143.522	0.000211
284.13031	0.00031	975.0463	0.013831	146.6715	0.000509
285.12031	0.00031	975.3228	0.000585	160.0238	0.023774
287.76031	0.00031	978.3367	0.004258	176.6113	0.026442
300.02565	0.02565	984.6544	0.000336	177.6254	0.000667
301.29031	0.00031	993.9725	0.012343	180.03	0.030044
310.86031	0.00031	994.9573	0.000985	186.6675	0.020231
320.01938	0.01938	1000.023	0.022544	187.2488	0.027106
326.37031	0.00031	1000.328	0.025422	195.5675	0.017325
326.70031	0.00031	1009.058	0.000573	198.5113	0.028161
327.36031	0.00031	1014.399	0.02921	198.5425	0.025514
328.02031	0.00031	1017.469	0.00027	200.0238	0.023802
328.35031	0.00031	1020.01	0.010028	200.0238	0.023822
335.61031	0.00031	1024.361	0.00112	200.0238	0.023842
336.27031	0.00031	1038.772	0.000464	200.0239	0.023862
337.59031	0.00031	1040.023	0.022524	200.0239	0.023882
338.25031	0.00031	1040.73	0.024369	200.0239	0.023902
344.19031	0.00031	1052.429	0.001365	229.7659	0.000433
348.15031	0.00031	1055.392	0.000181	238.3421	0.000595
354.09031	0.00031	1060.016	0.016278	240.03	0.030028
354.42031	0.00031	1080.023	0.02302	258.6175	0.012745

359.04031	0.00031	1092.558	0.000554	260.0175	0.017544
359.37031	0.00031	1094.985	0.014401	261.3858	0.001092
360.02488	0.02488	1099.004	0.000665	269.0925	0.019025
365.31031	0.00031	1100.023	0.022564	271.2548	0.000556
365.97031	0.00031	1100.917	6.00E-05	276.7113	0.031645
370.26031	0.00031	1102.523	0.010959	280.0238	0.023774
372.90031	0.00031	1112.139	0.000276	294.9863	0.01984
381.48031	0.00031	1123.669	0.000355	300.0175	0.017528
391.71031	0.00031	1137.256	0.003867	314.1528	0.002146
396.00031	0.00031	1140.023	0.022536	314.9668	0.000487
396.66031	0.00031	1142.969	0.000678	319.2432	0.00173
397.32031	0.00031	1160.023	0.022524	320.0175	0.017544
400.02502	0.025024	1160.931	0.012199	321.4178	0.002482
400.95031	0.00031	1169.126	0.000422	328.2988	0.017241
402.93031	0.00031	1180.016	0.016274	340.0175	0.017528
409.20031	0.00031	1182.97	0.000756	340.9863	0.01303
420.03167	0.03167	1187.301	0.000558	354.2363	0.018457
420.42031	0.00031	0.026298	0.026298	360.0175	0.017544
424.05031	0.00031	2.642575	0.000808	380.0175	0.017528
430.98031	0.00031	16.95977	0.000483	384.9988	0.025967
434.28031	0.00031	20.02004	0.020044	395.5064	0.000289
440.22031	0.00031	40.02007	0.020072	399.2175	0.043535
440.55031	0.00031	60.02635	0.026346	400.0176	0.017548
443.19031	0.00031	64.03272	0.000895	412.5518	0.001275
448.80031	0.00031	72.15552	0.000796	414.5987	0.000587
461.34031	0.00031	80.02004	0.020044	420.03	0.030024
463.32031	0.00031	82.28752	0.013431	425.1488	0.015739
464.97031	0.00031	100.0138	0.013818	437.1738	0.017338
478.83031	0.00031	120.0201	0.020068	440.0238	0.023794
479.49031	0.00031	133.3797	0.00023	441.0216	0.001682
480.0255	0.0255	140.0138	0.013818	456.6264	0.006034
480.04252	0.042524	148	0.017075	460.0175	0.017524
480.81031	0.00031	154.7731	0.000509	464.7764	0.006727
481.14031	0.00031	160.0138	0.013818	466.4988	0.028727
492.36031	0.00031	162.475	0.000968	480.0175	0.017528
497.31031	0.00031	169.9061	0.000193	500.0176	0.017548
501.93031	0.00031	174.876	0.007485	513.8792	0.000559
502.92031	0.00031	176.7513	0.000733	520.0238	0.023794
525.03031	0.00031	180.0201	0.020068	537.0192	0.001781
525.36031	0.00031	200.0138	0.013822	540.03	0.030024
531.63031	0.00031	206.89	0.022864	557.43	0.00035
540.0293	0.029304	293.1962	28.36561	580.0238	0.023798
543.51031	0.00031	293.1962	28.36563	593.1926	19.6072
548.13031	0.00031	293.1977	53.19768	593.1926	19.4385
560.02022	0.020224	293.1977	73.1977	593.2052	56.45708
562.98031	0.00031	293.1978	13.19778	600.03	0.030028
577.83031	0.00031	293.2089	33.2089	601.9613	0.01246
578.16031	0.00031	293.2119	43.26163	609.28	0.021612

578.49031	0.00031	293.2141	54.49189	613.2738	0.027478
578.82031	0.00031	293.2371	59.75965	616.73	0.029437
581.79031	0.00031	293.2371	70.44175	620.0175	0.017528
583.77031	0.00031	293.2371	71.24751	640.0238	0.023798
588.72031	0.00031	300.0201	0.020056	660.03	0.030024
589.05031	0.00031	303.6625	0.012776	664.0184	0.001637
590.04031	0.00031	311.8469	0.001171	671.8556	0.001809
592.35031	0.00031	320.02	0.020028	675.18	0.015836
593.01031	0.00031	346.0512	0.007826	680.0175	0.017528
596.31031	0.00031	358.9528	0.000568	692.605	0.026031
600.02845	0.028454	360.0263	0.026274	700.0175	0.017544
603.57031	0.00031	363.1548	0.000237	700.9406	0.000512
609.84031	0.00031	365.1875	0.016918	712.8226	0.002183
611.49031	0.00031	369.9832	0.000205	715.3843	0.00058
614.79031	0.00031	370.0938	0.009248	720.03	0.030024
618.09031	0.00031	380.0201	0.020052	727.1425	0.025235
625.68031	0.00031	388.3	0.016261	740.0175	0.017524
627.33031	0.00031	393.885	0.028069	746.9238	0.016454
633.60031	0.00031	400.0201	0.020052	747.2988	0.013225
636.24031	0.00031	401.198	0.00145	747.9436	0.000736
636.57031	0.00031	420.0326	0.032548	760.0238	0.023774
640.00311	0.00311	421.7717	0.000216	778.6675	0.029508
641.52031	0.00031	429.3866	0.000275	780.0175	0.017528
642.84031	0.00031	429.4117	0.000512	780.7532	0.00328
643.17031	0.00031	440.0201	0.020088	790.4113	0.015116
648.78031	0.00031	442.4563	0.011833	795.9234	0.000991
652.74031	0.00031	442.9725	0.02785	797.6925	0.027339
656.37031	0.00031	460.0201	0.020064	804.5675	0.018925
660.03096	0.0309615	477.3653	0.0009	809.3415	0.001516
667.59031	0.00031	480.0201	0.020072	813.4675	0.014158
669.24031	0.00031	483.975	0.014207	819.0948	0.000654
675.84031	0.00031	488.8707	0.001209	820.0175	0.017544
681.12031	0.00031	500.0263	0.026282	820.0176	0.017564
681.78031	0.00031	508.595	0.024913	820.3863	0.0242
684.42031	0.00031	521.4832	0.00619	820.4488	0.026554
688.71031	0.00031	523.8076	0.000381	820.4511	0.001847
692.01031	0.00031	537.1875	0.01502	826.2363	0.019726
696.63031	0.00031	540.02	0.020028	840.0175	0.017544
697.29031	0.00031	560.0138	0.013822	860.0176	0.017548
697.62031	0.00031	565.6154	0.000264	869.33	0.026391
697.95031	0.00031	580.0138	0.013838	880.0176	0.017556
700.26031	0.00031	590.15	0.018749	881.2538	0.000395
702.57031	0.00031	600.02	0.020044	887.4238	0.026738
707.85031	0.00031	607.3157	0.000512	900.0363	0.036274
710.82031	0.00031	610.3944	0.000388	920.0175	0.017532
717.09031	0.00031	620.02	0.020044	923.455	0.028752
720.02625	0.02625	632.8998	0.005422	926.2488	0.025806
720.04377	0.043774	633.2271	0.001387	940.0238	0.023774

722.04031	0.00031	640.0201	0.020096	960.03	0.030028
722.70031	0.00031	647.275	0.027812	965.2595	0.000468
726.99031	0.00031	649.4459	0.000789	980.0175	0.017544
735.57031	0.00031	652.8127	0.000306	984.0425	0.026306
745.47031	0.00031	657.3885	6.00E-05	985.2675	0.015208
746.13031	0.00031	660.0325	0.032532	1000.024	0.023774
749.10031	0.00031	668.8939	0.0011	1008.893	0.026925
751.08031	0.00031	670.873	0.000403	1010.53	0.00055
753.06031	0.00031	680.0201	0.020052	1017.299	0.028902
757.68031	0.00031	684.4049	0.000285	1020.03	0.030024
760.98031	0.00031	693.6025	0.023581	1020.18	0.026936
762.30031	0.00031	700.0201	0.020068	1024.161	0.015727
763.29031	0.00031	703.976	0.000989	1040.024	0.023778
763.62031	0.00031	705.195	0.012011	1060.024	0.023774
764.94031	0.00031	720.0201	0.020088	1070.268	0.011297
766.59031	0.00031	740.0201	0.020088	1080.03	0.030048
769.89031	0.00031	744.6896	0.000275	1089.386	0.034163
780.03252	0.032524	746.4937	0.000372	1091.249	0.00258
782.43031	0.00031	760.02	0.020028	1100.024	0.023806
784.08031	0.00031	762.2305	0.001214	1100.1	0.001632
786.72031	0.00031	769.7983	9.36E-05	1111.562	0.000441
788.37031	0.00031	780.0263	0.026294	1111.805	0.014885
788.70031	0.00031	800.0201	0.02006	1113.568	0.011766
789.36031	0.00031	814.9761	0.00026	1120.024	0.023794
791.67031	0.00031	820.0201	0.020084	1140.03	0.030036
799.59031	0.00031	825.375	0.008296	1140.886	0.028959
799.92031	0.00031	831.8274	0.000435	1141.698	0.00026
800.01934	0.01934	833.77	0.027361	1148.157	0.002178
801.90031	0.00031	842.9951	0.000236	1148.968	0.001013
803.22031	0.00031	848.1713	0.022668	1149.724	0.024002
817.08031	0.00031	860.0201	0.020084	1152.024	0.023546
820.05031	0.00031	865.8525	0.025593	1153.811	0.028595
825.00031	0.00031	866.6927	0.006195	1156.486	0.025646
831.93031	0.00031	877.3625	0.009476	1160.024	0.023798
834.90031	0.00031	880.0201	0.020092	1162.524	0.029305
840.03877	0.038774	880.3938	0.01441	1180.024	0.023782
841.17031	0.00031	894.7569	0.000547	1189.201	0.000355
843.48031	0.00031	900.0263	0.026306	1196.568	0.019632
844.47031	0.00031	914.0727	0.000823	0.036294	0.036294
846.12031	0.00031	920.0201	0.020088	8.425192	0.000269
846.45031	0.00031	925.6343	0.001066	20.01754	0.017544
849.09031	0.00031	934.6657	0.000759	22.73821	0.001667
850.08031	0.00031	938.2713	0.024453	24.44253	0.028073
855.03031	0.00031	940.0201	0.020088	32.53628	0.01141
857.01031	0.00031	942.1936	0.000169	40.02377	0.023774
859.32031	0.00031	948.9075	6.00E-05	44.90587	0.003011
859.65031	0.00031	954.2563	0.008648	48.19253	0.025878
868.56031	0.00031	955.0838	0.026842	60.01752	0.017524

869.22031	0.00031	958.15	0.014179	70.33627	0.019776
869.88031	0.00031	958.8324	0.000672	78.56128	0.025148
870.87031	0.00031	960.0201	0.020064	80.02381	0.023806
874.50031	0.00031	960.1063	0.016902	82.91753	0.024231
880.03502	0.035024	970.3199	0.000185	92.2468	0.002198
880.11031	0.00031	980.0263	0.026294	100.0238	0.023778
885.06031	0.00031	981.6185	0.001425	100.1675	0.015117
886.38031	0.00031	988.0169	0.000335	108.0168	0.000758
891.33031	0.00031	989.1813	0.001662	113.9675	0.026349
895.29031	0.00031	1000.02	0.020044	120.0363	0.036282
897.60031	0.00031	1019.067	0.001234	127.8164	0.000608
899.58031	0.00031	1020.02	0.020076	135.3363	0.027953
900.03504	0.035044	1022.012	0.000226	139.355	0.025404
900.90031	0.00031	1028.541	0.000416	140.0238	0.023774
903.54031	0.00031	1040.014	0.013818	160.0238	0.023794
903.87031	0.00031	1044.006	0.017046	161.0925	0.02674
906.51031	0.00031	1048.464	0.023629	180.03	0.030044
913.77031	0.00031	1050.919	0.000308	183.0399	0.001428
919.05031	0.00031	1051.227	0.000766	200.0238	0.023782
920.04031	0.00031	1059.987	0.001365	203.5738	0.015099
922.68031	0.00031	1060.014	0.013822	211.0425	0.027477
925.32031	0.00031	1080.026	0.026282	216.93	0.025447
927.63031	0.00031	1080.549	0.000233	218.139	0.001178
933.57031	0.00031	1082.128	0.000246	220.0238	0.023798
935.88031	0.00031	1088.369	0.013332	227.255	0.029983
939.18031	0.00031	1099.718	0.000317	227.8771	0.007357
943.80031	0.00031	1100.014	0.013822	231.2863	0.024845
954.69031	0.00031	1102.831	9.48E-05	232.0255	0.000385
955.02031	0.00031	1120.014	0.013834	240.0301	0.030048
960.02756	0.02756	1122.694	0.014243	250.4425	0.012169
960.03127	0.031274	1127.486	0.000192	251.205	0.019638
960.96031	0.00031	1137.823	0.000839	260.0175	0.017524
961.29031	0.00031	1140.02	0.020028	262.2753	0.001815
963.27031	0.00031	1156.658	0.014511	280.0175	0.017544
966.24031	0.00031	1160.014	0.013842	282.1047	0.002236
967.56031	0.00031	1175.094	0.011776	284.93	0.012355
970.53031	0.00031	1177.166	0.028363	305.005	0.016383
970.86031	0.00031	1180.014	0.013818	309.905	0.021199
972.51031	0.00031	1190.274	0.000435	320.0175	0.017544
977.13031	0.00031	1197.888	0.000483	326.08	0.027338
981.42031	0.00031	0.026318	0.026318	340.0238	0.023774
981.75031	0.00031	4.402524	0.027076	341.1988	0.026524
982.41031	0.00031	10.65002	0.013734	347.3853	0.000984
985.05031	0.00031	20.02008	0.020084	352.3549	0.007469
989.67031	0.00031	20.99377	0.008709	360.0175	0.017544
992.97031	0.00031	34.79284	0.001325	361.8425	0.016805
1011.1203	0.00031	40.02005	0.020052	366.3613	0.025757
1013.7603	0.00031	60.02009	0.020092	380.0176	0.017548

1020.0159	0.0159	60.09377	0.015936	382.0425	0.027156
1026.6303	0.00031	80.01384	0.013838	385.8133	0.001063
1034.8803	0.00031	90.90252	0.023553	400.0176	0.017548
1040.0204	0.020434	96.54259	0.000271	405.6988	0.025326
1045.1103	0.00031	97.77502	0.017107	415.0126	0.000761
1056.6603	0.00031	100.0263	0.026294	420.03	0.030044
1076.1303	0.00031	120.0263	0.026302	421.7492	0.000655
1078.1103	0.00031	122.4912	0.000233	426.4458	0.000357
1079.4303	0.00031	125.9263	0.025244	427.1425	0.019167
1080.0302	0.030234	127.5649	0.001489	440.0238	0.023774
1081.4103	0.00031	130.5575	0.026352	455.48	0.025102
1083.3903	0.00031	133.5225	0.024364	455.8549	0.000869
1091.6403	0.00031	140.0263	0.026274	457.6425	0.011777
1095.6003	0.00031	140.0263	0.026294	460.0175	0.017544
1099.2303	0.00031	140.0263	0.026314	461.725	0.001076
1100.2203	0.00031	140.0263	0.026334	480.0176	0.017548
1107.1503	0.00031	140.0264	0.026354	489.4613	0.026544
1107.8103	0.00031	140.0264	0.026374	492.0705	0.001823
1119.0303	0.00031	159.9813	0.000409	500.0176	0.017548
1120.0101	0.010108	160.0139	0.013858	508.6281	0.001682
1120.021	0.000998	180.0201	0.020088	520.0238	0.023794
1121.3403	0.00031	192.675	0.015937	537.166	0.002231
1123.9803	0.00031	200.0138	0.013822	540.03	0.030044
1124.3103	0.00031	204.585	0.008882	546.3048	0.001125
1125.6303	0.00031	293.1901	40.29434	560.0238	0.023778
1127.6103	0.00031	293.1965	6.393545	561.7142	0.002765
1129.5903	0.00031	293.1977	73.19768	566.4474	0.000602
1129.9203	0.00031	293.2031	83.51808	571.5203	0.000576
1139.4903	0.00031	293.2037	48.65707	577.805	0.012997
1140.0413	0.041274	293.2104	35.79189	580.0238	0.023798
1140.4803	0.00031	293.2257	53.22574	593.1926	32.80616
1143.1203	0.00031	293.2258	33.22576	593.1926	35.07502
1148.7303	0.00031	293.2258	13.22578	600.0363	0.036274
1152.6903	0.00031	293.2372	62.32797	620.0238	0.023778
1155.0003	0.00031	293.2381	4.636014	630.5069	0.000232
1155.6603	0.00031	320.0201	0.020048	639.2193	0.000992
1155.9903	0.00031	322.645	0.01115	640.0238	0.023778
1156.6503	0.00031	324.0237	0.00494	641.7964	0.000367
1157.9703	0.00031	334.7999	0.000816	649.9026	0.000784
1160.9403	0.00031	340.0201	0.020088	651.4738	0.024115
1169.8503	0.00031	342.2463	0.025606	660.03	0.030044
1170.1803	0.00031	347.05	0.01517	679.6613	0.029951
1174.4703	0.00031	357.0938	0.014246	680.0176	0.017548
1175.4603	0.00031	357.7033	0.000641	683.1113	0.024285
1182.0603	0.00031	360.0201	0.02006	683.3403	0.000426
1183.3803	0.00031	360.9818	0.000436	691.9109	0.001426
1188.3303	0.00031	369.6169	6.00E-05	700.0175	0.017544
1192.2903	0.00031	380.0201	0.020072	703.9175	0.018515

1192.9503	0.00031	385.9313	0.017766	705.3738	0.011328
1199.5503	0.00031	386.4125	0.008698	712.7675	0.029544
1183.0503	0.00031	400.0201	0.020092	716.6331	0.002141
1187.6703	0.00031	416.0463	0.000636	720.0176	0.01757
1190.6403	0.00031	420.0325	0.032528	723.7925	0.014175
1194.9303	0.00031	433.6283	4.20E-05	738.8425	0.025818
1197.9003	0.00031	435.1865	0.000298	740.0238	0.023778
1160.02	0.020044	440.0201	0.02011	740.0613	0.015371
1166.976	0.000421275	442.2438	0.014555	751.5986	0.004781
1177.0729	0.002276725	447.3219	0.000911	752.2613	0.013606
1178.4096	0.001214317	451.3688	0.015978	760.0175	0.017528
1186.7349	0.000326192	460.02	0.020044	773.0863	0.021978
1187.3188	0.023762413	470.8578	4.20E-05	780.0176	0.017548
1188.0325	0.014971917	485.0719	0.000258	785.8425	0.026138
728.9028	0.007110786	485.41	0.025172	798.3425	0.016003
730.41708	0.000452075	489.722	0.00109	811.5425	0.027828
734.37457	0.008337323	489.7325	0.023573	820.0175	0.017524
740.00754	0.007544	499.0638	0.012127	825.4175	0.015833
751.74502	0.023885974	499.6504	0.000807	829.555	0.029041
751.92442	0.000384699	500.02	0.020044	833.805	0.026452
760.02004	0.02004	506.3155	0.000534	838.6978	0.001382
762.96284	0.001722708	511.6013	0.022349	840.0175	0.017544
763.75589	0.000858805	518.9138	0.021638	841.9363	0.000533
771.18252	0.022975064	520.0263	0.026274	851.1727	0.00061
776.87502	0.020215921	526.2563	0.011303	860.0176	0.017548
780.00752	0.007524	528.9186	0.000997	876.3675	0.033651
800.02004	0.020044	536.8779	7.34E-05	880.0175	0.017536
800.72502	0.02373328	540.0201	0.020068	885.6113	0.025345
801.15267	0.000336596	549.4138	0.024237	895.3862	0.00074
820.01379	0.013794	557.4175	0.000298	897.3763	0.000729
840.01379	0.013794	560.02	0.020024	900.0175	0.017544
847.89205	0.000319156	580.02	0.020024	903.3675	0.014854
860.01379	0.013794	580.4975	0.024788	905.13	0.017942
871.49221	0.00046209	586.9886	0.007333	909.98	0.029138
880.02005	0.020048	600.0201	0.020084	916.4731	0.00061
880.02007	0.020068	604.1025	0.023771	920.0238	0.023774
880.02009	0.020088	612.788	0.00029	938.7738	0.015807
880.02011	0.020108	618.85	0.015159	940.0176	0.017556
900.02627	0.026274	619.9813	0.011608	943.2306	0.002418
909.53138	0.000729867	620.02	0.020044	945.7208	0.001607
914.32925	0.000285873	636.2741	0.000588	949.9497	0.001454
914.90635	0.000426937	640.0201	0.020136	960.0175	0.017524
920.01377	0.013774	658.0237	0.000221	962.3238	0.02501
925.67354	0.000118508	660.0201	0.020088	966.3687	0.000883
928.99788	0.001198141	662.7816	4.20E-05	978.1755	0.00741
940.01377	0.013774	677.5513	0.014462	980.0175	0.017524
945.89377	0.023382469	679.0463	0.027684	999.1113	0.02488
954.00002	0.023118514	680.0201	0.020052	1000.018	0.017544

960.00753	0.007528	700.0201	0.020088	1020.024	0.023774
961.76154	0.00098303	703.7872	6.00E-05	1023.67	0.001295
964.39502	0.009399722	714.0655	0.000404	1029.469	0.001637
975.61139	0.001199682	718.3471	4.20E-05	1040.024	0.023798
980.01378	0.013782	720.0201	0.020068	1050.449	0.022004
993.19189	0.000341195	726.7906	6.00E-05	1060.024	0.023814
996.68474	0.000222556	739.825	0.012705	1069.033	0.001074
996.72692	0.002117218	740.0201	0.020068	1080.03	0.030048
1000.0138	0.013794	741.9823	0.00048	1082.206	0.001637
1000.15	0.021613897	743.845	0.021464	1083.919	0.000181
1002.4917	0.000151126	754.5163	0.023827	1087.368	0.022847
1012.959	0.000140472	760.0201	0.020088	1089.856	0.000702
1034.9138	0.025266334	764.9375	0.016299	1090.824	0.001057
1035.1785	0.000574787	780.0263	0.026294	1100.024	0.023806
1040.02	0.020044	782.6388	0.00162	1103.168	0.028194
1053.7275	0.025414591	791.7013	0.02578	1110.393	0.013283
1060.02	0.020044	820.0201	0.020064	1111.286	0.011328
1065.3937	0.006390005	821.6938	0.012468	1116.308	0.001047
1080.02	0.020024	833.965	0.022654	1117.836	0.012287
1085.9297	0.001244783	836.2164	0.001218	1120.024	0.023794
1096.1772	0.000461244	837.6412	0.000343	1127.049	0.034569
1100.0263	0.026274	840.0263	0.026294	1140.043	0.042524
1100.8075	0.025200695	840.6075	0.01133	1151.355	0.011497
1119.395	0.018969874	842.701	0.00044	1160.024	0.023778
1120.0201	0.020064	848.815	0.026868	1161.377	0.001485
1129.9845	0.001669699	851.3436	0.0007	1168.774	0.024135
1130.4454	0.013468177	854.3373	0.000394	1180.024	0.023802
1132.8522	0.000370479	860.0201	0.020064	1185.024	0.029199



## APPENDIX K. RUN THREE TEST DATA

Each time point in the chart represents a message. This simulation only contained CID information requirements.

<u>TIME</u>	<u>DELAY</u>	<u>TIME</u>	<u>DELAY</u>	<u>TIME</u>	<u>DELAY</u>
0.00033	0.013782	183.03978	0.012954	348.48031	0.020048
0.00174	0.013782	184.80031	0.024824	348.81031	0.020028
0.00199	0.020024	186.66752	0.00031	350.46031	0.02006
0.00224	0.013786	186.78031	0.00031	351.78031	0.020048
0.00352	0.013786	187.24877	0.00031	352.34815	0.020044
0.013782	0.013806	187.77031	0.00031	353.10031	0.02006
0.013802	0.013786	189.75031	0.00031	353.76031	0.020068
0.017914	0.013806	190.74031	0.00031	354.09031	0.020068
0.019434	0.013778	191.73031	0.00031	354.23002	0.02012
0.020048	0.013786	194.70031	0.00031	355.74031	0.026302
0.020064	0.013786	195.02879	0.00031	356.73031	0.020088
0.020124	0.013782	195.03502	0.00031	357.06031	0.020076
0.021294	0.020056	195.56752	0.00031	357.72031	0.020072
0.02131	0.026278	195.69031	0.00031	358.38031	0.013858
0.022528	0.020044	197.34031	0.00031	359.04031	0.020044
0.022548	0.013798	198.51127	0.00031	359.37031	0.020048
0.023994	0.020048	198.54252	0.00031	359.70031	0.013818
0.026302	0.013786	199.32031	0.00031	360.00077	0.013858
0.027574	0.020028	200.00066	0.00031	360.00181	0.020048
0.028774	0.013794	200.00166	0.00031	360.00206	0.013858
0.028794	0.02004	200.00249	0.00031	360.00323	0.026274
0.030024	0.020056	200.00249	0.00031	360.00752	0.026294
0.030044	0.013802	200.01379	0.0297125	360.01002	0.026314
0.035024	0.020044	200.01381	0.00031	360.01002	0.026334
0.035024	0.020024	200.01384	0.00031	360.01004	0.026354
0.041274	0.032532	200.01386	0.00031	360.01611	0.026374
0.041294	0.013806	200.01386	0.00031	360.01629	0.020084
0.042524	0.013786	200.01506	0.00031	360.01633	0.020044
0.042544	0.013806	200.01631	0.00031	360.01753	0.020044
1.65031	0.013806	200.02004	0.02263	360.01755	0.032524
2.31031	0.020024	200.02129	0.00031	360.02005	0.026294
3.63031	0.013806	200.02254	0.00031	360.02005	0.020088
5.61031	0.013806	200.02254	0.00031	360.02006	0.020108
7.321451	0.013802	200.02254	0.00031	360.0201	0.020128
7.59031	0.013806	200.02377	0.00031	360.02012	0.020148
8.4254207	0.020024	200.02379	0.00031	360.02127	0.020168
10.205024	0.020056	200.0238	0.00031	360.02377	0.020188
10.23031	0.020044	200.02627	0.00031	360.02627	0.020208

10.56031	0.020028	200.03502	0.00031	360.02694	0.020228
10.89031	0.020048	200.03504	0.00031	360.02694	0.020248
11.88031	0.013806	200.64031	0.00031	360.02879	0.020268
12.87031	0.020044	203.57377	0.00031	360.02879	0.020288
13.20031	0.026274	205.59031	0.02694	360.02881	0.0201
13.53031	0.020024	207.24031	0.00031	360.03002	0.020068
15.028794	0.020056	207.90031	0.00031	360.03502	0.020088
15.028814	0.00199	210.02879	0.00031	360.03504	0.020108
16.50031	0.00154	210.03502	0.00031	360.03787	0.020128
16.83031	0.00108	210.54031	0.00031	361.68031	0.020148
17.49031	0.00197	211.04252	0.00031	361.84252	0.020168
20.0009	0.00068	211.20031	0.00031	362.34031	0.020106
20.00181	0.0024	213.18031	0.00031	362.67031	0.02012
20.00231	0.00116	215.82031	0.00031	364.32031	0.020088
20.007544	0.00114	216.93002	0.00031	364.65031	0.020068
20.008778	0.00043	218.13807	0.00031	364.98031	0.020195
20.010028	0.00166	220.00041	0.00031	365.64031	0.020124
20.010044	0.00249	220.00141	0.00031	365.97031	0.020028
20.010044	0.00043	220.00191	0.00031	366.34877	0.020116
20.010048	0.00335	220.00249	0.00031	366.63031	0.026274
20.010084	0.00384	220.01379	0.00031	366.96031	0.013854
20.013774	0.0011	220.01381	0.00031	367.95031	0.020088
20.013782	0.00094	220.01384	0.00031	368.94031	0.020024
20.017524	0.00181	220.01506	0.025024	370.26031	0.013838
20.017528	0.00179	220.01628	0.00031	370.59031	0.020068
20.017544	0.0031715	220.01628	0.00031	371.58031	0.013858
20.020028	0.00135	220.0163	0.00031	371.91031	0.013838
20.020044	0.00125	220.0163	0.00031	372.57031	0.020084
20.020048	0.00129	220.02002	0.00031	373.23031	0.020104
20.020088	0.00081	220.02004	0.00031	373.89031	0.020104
20.02131	0.00224	220.02127	0.00031	375.02254	0.026282
20.023794	0.00181	220.02252	0.02438	375.02256	0.026274
20.035044	0.00339	220.02254	0.00031	375.54031	0.020128
20.035044	0.00323	220.02377	0.00031	376.86031	0.02012
20.13031	0.00168	220.02379	0.00031	377.19031	0.020108
20.79031	0.0020315	220.02379	0.00031	377.52031	0.020064
22.11031	0.00168	220.02379	0.00031	379.50031	0.02631
22.737357	0.0019815	220.02627	0.00031	380.00067	0.020088
23.316498	0.00191	220.02629	0.00031	380.00094	0.020108
24.42031	0.00257	220.02631	0.00031	380.00179	0.02631
24.442524	0.00066	220.02633	0.00031	380.00239	0.041294
25.41031	0.00141	220.02635	0.00031	380.00756	0.028794
26.73031	0.00192	220.02637	0.00031	380.01002	0.022544
28.38031	0.00117	220.03504	0.00031	380.01006	0.022564
30.022544	0.00217	220.03504	0.00031	380.01379	0.028794
30.022564	0.0011	220.44031	0.00031	380.01381	0.028794
30.36031	0.00173	220.77031	0.00031	380.01627	0.028794
30.517176	0.00376	223.41031	0.00031	380.01753	0.035044

31.68031	0.00323	225.02879	0.00031	380.01754	0.041294
32.34031	0.00094	225.03502	0.00031	380.01754	0.035044
32.536274	0.0027	227.04031	0.00031	380.02004	0.035044
33.00031	0.00104	227.25502	0.030024	380.02005	0.028794
33.398774	0.00266	227.70031	0.031274	380.02007	0.035044
33.66031	0.00266	227.8712	0.00031	380.02009	0.035024
33.99031	0.00432	228.03031	0.00031	380.02011	0.028794
34.98031	0.00174	228.36031	0.00031	380.02011	0.035024
38.94031	0.00231	229.76579	0.00031	380.02013	0.047544
39.833408	0.00127	230.01031	0.00031	380.02015	0.028794
39.93031	0.00108	231.00031	0.00031	380.02017	0.022544
40.00127	0.00118	231.28627	0.00031	380.02127	0.022544
40.00154	0.00168	231.99031	0.00031	380.02257	0.028794
40.00206	0.00265	232.02545	0.00031	380.02377	0.022544
40.00339	0.00166	233.97031	0.00031	380.03504	0.022544
40.010024	0.00166	236.61031	0.01711	380.03504	0.022544
40.010028	0.00195	238.34174	0.00031	382.04252	0.022564
40.010044	0.00249	238.59031	0.00031	382.14031	0.022564
40.010068	0.00191	240.00043	0.00031	382.80031	0.028794
40.013794	0.00118	240.00118	0.00031	383.79031	0.022564
40.013794	0.00256	240.00192	0.00031	384.78031	0.022544
40.015048	0.00192	240.00219	0.00031	384.99877	0.02882
40.015068	0.00275	240.01295	0.00031	385.81254	0.022544
40.017524	0.00171	240.01378	0.00031	386.10031	0.035024
40.017524	0.00206	240.0138	0.00031	386.43031	0.028814
40.017544	0.00239	240.02005	0.00031	387.09031	0.022564
40.020024	0.00148	240.02006	0.00031	388.41031	0.022584
40.020056	0.0029	240.02008	0.00031	388.74031	0.028814
40.020076	0.00177	240.02008	0.00031	389.07031	0.028814
40.020116	0.00311	240.02129	0.00031	389.40031	0.028794
40.022544	0.00263	240.02252	0.00031	390.02256	0.028794
40.02257	0.023994	240.02255	0.00031	390.02256	0.041314
40.035044	0.027574	240.02256	0.00031	391.38031	0.028794
40.035044	0.00031	240.02257	0.00031	391.71031	0.035024
40.035064	0.00031	240.0226	0.00031	392.04031	0.028814
40.035084	0.00031	240.02482	0.03787	393.36031	0.035024
44.55031	0.00031	240.02817	0.00031	394.68031	0.028794
44.913756	0.00031	240.02819	0.00031	395.01031	0.035024
45.022564	0.00031	240.02879	0.00031	395.34031	0.028794
45.022584	0.00031	240.03002	0.00031	395.50619	0.047544
48.192524	0.00031	240.03004	0.00031	395.67031	0.035024
48.51031	0.00031	240.03005	0.00031	396.33031	0.022564
50.467524	0.00031	240.03252	0.00031	396.66031	0.022564
50.49031	0.00031	240.03502	0.00031	397.32031	0.028794
50.82031	0.00031	240.03504	0.00031	397.98031	0.022524
51.505024	0.00031	240.03627	0.00031	398.64031	0.022544
52.80031	0.00031	240.04754	0.00031	399.19877	0.022564
54.45031	0.00031	240.04754	0.00031	400.00092	0.022584

54.78031	0.00031	242.55031	0.027524	400.00148	0.022524
55.11031	0.00031	245.19031	0.00031	400.00214	0.028794
56.10031	0.00031	246.51031	0.00031	400.0027	0.022564
56.43031	0.00031	247.17031	0.00031	400.00317	0.022564
58.41031	0.00031	247.50031	0.02817	400.00756	0.022524
59.40031	0.00031	247.83031	0.00031	400.0088	0.035024
60.00108	0.00031	248.16031	0.00031	400.01004	0.022524
60.00108	0.00031	248.49031	0.00031	400.01005	0.022564
60.00298	0.00031	250.44252	0.00031	400.01005	0.022564
60.00323	0.02748	250.80031	0.00031	400.01007	0.035024
60.007524	0.00031	251.19877	0.00031	400.01008	0.022524
60.010032	0.00031	251.46031	0.00031	400.01506	0.041274
60.010052	0.011604	253.77031	0.00031	400.01753	0.035044
60.015028	0.00031	254.10031	0.00031	400.01754	0.035044
60.016286	0.00031	255.02879	0.00031	400.01755	0.035044
60.016306	0.00031	255.03502	0.00031	400.02004	0.035024
60.017528	0.00031	255.09031	0.00031	400.02004	0.035044
60.017544	0.00031	257.07031	0.00031	400.02004	0.035044
60.017548	0.00031	258.61752	0.00031	400.02006	0.035044
60.020024	0.00031	258.72031	0.00031	400.02011	0.035044
60.020072	0.021684	259.38031	0.00031	400.02252	0.041274
60.020072	0.00031	260.00117	0.00031	400.02377	0.035044
60.023774	0.00031	260.00256	0.00031	400.02502	0.035044
60.026274	0.00031	260.0031	0.02531	400.02502	0.035044
60.026294	0.00031	260.00335	0.029431	400.02752	0.035044
60.02748	0.00031	260.00752	0.00031	400.03502	0.035044
60.02754	0.00031	260.00754	0.00031	400.03504	0.041274
60.02798	0.00031	260.01002	0.00031	400.29031	0.035044
60.028794	0.020934	260.01004	0.00031	400.95031	0.035044
60.028814	0.00031	260.01004	0.00031	401.28031	0.035044
60.032532	0.00031	260.01006	0.007544	401.61031	0.035044
60.035024	0.00031	260.01008	0.013794	402.27031	0.035044
60.035044	0.00031	260.01381	0.026294	403.59031	0.035044
60.39031	0.00031	260.01752	0.026274	403.92031	0.035024
69.63031	0.00031	260.01753	0.020048	404.25031	0.035024
70.29031	0.030554	260.01754	0.020048	404.91031	0.035024
70.330024	0.00031	260.01755	0.020024	405.02252	0.035024
71.480024	0.00031	260.02004	0.026274	405.02256	0.035044
72.93031	0.00031	260.02004	0.026294	405.24031	0.035044
74.348774	0.00031	260.0201	0.026274	405.69877	0.035064
74.91031	0.00031	260.02129	0.020048	407.22031	0.035084
75.028794	0.00031	260.02131	0.007544	408.21031	0.035024
75.028814	0.00031	260.02133	0.013794	408.87031	0.035044
77.236274	0.00031	260.02135	0.013774	409.86031	0.035024
78.21031	0.00031	260.02137	0.013794	410.19031	0.035044
78.561274	0.00031	260.02139	0.026274	410.52031	0.035024
80.00118	0.00031	260.02141	0.020036	411.84031	0.035044
80.00168	0.00031	260.02143	0.020036	412.55093	0.041294

80.00197	0.00031	260.02145	0.013794	412.83031	0.035024
80.011604	0.00031	260.02147	0.020036	413.49031	0.035044
80.013786	0.00031	260.02149	0.032524	413.82031	0.035024
80.013858	0.00031	260.02151	0.020048	414.15031	0.035044
80.015036	0.00031	260.02153	0.013774	414.59849	0.035044
80.016274	0.028174	260.03504	0.013794	415.01206	0.035024
80.016314	0.028194	260.03504	0.007524	416.79031	0.035044
80.020024	0.00031	261.385	0.020024	417.45031	0.035044
80.020414	0.00031	262.27392	0.026294	418.11031	0.035024
80.021298	0.00031	262.35031	0.020044	418.44031	0.035044
80.022544	0.00031	262.68031	0.013806	419.76031	0.035024
80.022544	0.00031	263.01031	0.020048	420.00104	0.035024
80.022584	0.00031	263.67031	0.020044	420.00135	0.035044
80.022584	0.00031	264.66031	0.020024	420.0029	0.035044
80.023774	0.00031	267.63031	0.032524	420.00399	0.035044
80.023806	0.00031	269.08627	0.007524	420.00878	0.010048
80.023806	0.00031	269.28031	0.020048	420.01005	0.02257
80.026274	0.00031	270.02254	0.013774	420.01377	0.010052
80.026274	0.00031	270.02256	0.007524	420.01379	0.022544
80.035024	0.00031	271.25532	0.013774	420.0163	0.022544
80.035044	0.00031	271.26031	0.007524	420.0164	0.028798
81.322709	0.00031	276.21031	0.007564	420.01652	0.022544
82.50031	0.00031	276.54031	0.007564	420.01752	0.022544
82.83031	0.00031	276.70502	0.013774	420.02003	0.022548
82.917524	0.00031	277.20031	0.007524	420.02006	0.016306
83.49031	0.00031	280.00117	0.013794	420.02012	0.016298
84.48031	0.00031	280.00192	0.026274	420.02127	0.022564
90.028794	0.031274	280.00217	0.02131	420.02256	0.010064
90.028794	0.00031	280.00384	0.008778	420.02377	0.010044
90.75031	0.00031	280.00879	0.015048	420.02438	0.016294
91.08031	0.00031	280.01004	0.015028	420.02627	0.010044
92.244789	0.00031	280.01005	0.021298	420.02631	0.010044
92.73031	0.00031	280.01006	0.021278	420.02817	0.022524
95.70031	0.00031	280.01007	0.021298	420.02817	0.02256
96.081939	0.00031	280.01009	0.021298	420.02879	0.010044
98.01031	0.02188	280.01506	0.021274	420.03002	0.010044
100.00068	0.00031	280.01752	0.021294	420.03004	0.028802
100.00093	0.00031	280.01753	0.021286	420.03502	0.022528
100.00168	0.00031	280.01754	0.021274	420.03502	0.010028
100.00203	0.00031	280.01755	0.021294	420.03504	0.010032
100.01379	0.00031	280.02002	0.008794	420.04002	0.022584
100.01381	0.00031	280.02004	0.008774	420.42031	0.022564
100.01383	0.00031	280.02004	0.015095	421.08031	0.022528
100.01385	0.01611	280.02005	0.021274	421.41031	0.016302
100.01506	0.00031	280.02006	0.021274	421.75001	0.016286
100.01628	0.00031	280.0201	0.008798	423.39031	0.016286
100.02004	0.00031	280.02257	0.008778	424.38031	0.022544
100.02005	0.00031	280.03504	0.015024	424.71031	0.016278

100.02128	0.00031	280.03504	0.008794	425.14877	0.022524
100.02254	0.00031	282.10275	0.008798	426.03031	0.010024
100.02254	0.00031	282.15031	0.00352	426.44581	0.010064
100.02256	0.00031	282.48031	0.0009	427.13627	0.010024
100.02256	0.00031	283.80031	0.00206	428.34031	0.010048
100.02261	0.025024	284.93002	0.00298	428.67031	0.010084
100.02377	0.00031	285.02254	0.00093	429.00031	0.010024
100.02378	0.00031	285.02256	0.00118	430.32031	0.016274
100.02379	0.00031	286.11031	0.00193	432.96031	0.010044
100.0238	0.00031	287.76031	0.00068	433.29031	0.010048
100.02629	0.00031	288.75031	0.00249	433.62031	0.010044
100.03502	0.00031	289.08031	0.00041	433.95031	0.010066
100.03504	0.00031	289.41031	0.00219	434.28031	0.010024
100.17377	0.00031	290.73031	0.0031	435.02252	0.022548
100.65031	0.040024	291.06031	0.00117	435.02256	0.010028
102.63031	0.00031	291.39031	0.00135	436.26031	0.010068
103.29031	0.00031	291.72031	0.00063	437.17377	0.022584
103.62031	0.00031	292.38031	0.00146	437.25031	0.022606
104.61031	0.00031	293.70031	0.00077	437.58031	0.022588
105.02879	0.00031	294.98002	0.00067	438.24031	0.022524
105.03504	0.00031	295.35031	0.00092	438.57031	0.022604
108.01694	0.00031	295.68031	0.00399	439.23031	0.022568
110.74252	0.00031	296.01031	0.0015	439.56031	0.022524
110.88031	0.00031	296.67031	0.0016	440.00125	0.022604
113.96752	0.00031	297.99031	0.00164	440.0015	0.010084
115.50031	0.00031	298.65031	0.021294	440.00177	0.02257
117.48031	0.00031	300.0011	0.02131	440.00266	0.010084
120.00118	0.00031	300.0011	0.015068	440.00752	0.016439
120.00168	0.00031	300.00135	0.02754	440.01002	0.010104
120.0024	0.00031	300.00275	0.015036	440.01004	0.028786
120.00265	0.00031	300.00877	0.015056	440.01004	0.028806
120.01379	0.00031	300.01002	0.033774	440.01004	0.02257
120.01381	0.00031	300.01008	0.015056	440.01006	0.010084
120.02003	0.00031	300.01377	0.015056	440.01379	0.016302
120.02005	0.031524	300.01379	0.015056	440.01502	0.02267
120.02005	0.046274	300.01631	0.015056	440.01752	0.010066
120.02009	0.00031	300.01755	0.015056	440.01753	0.042524
120.0213	0.00031	300.01755	0.021294	440.01754	0.003853956
120.02168	0.00031	300.01938	0.021314	440.02002	0.017299659
120.02218	0.00031	300.02006	0.021334	440.02007	0.023794
120.02253	0.00031	300.02006	0.021354	440.02009	0.000297846
120.02253	0.00031	300.02252	0.021374	440.02009	0.000306533
120.02259	0.00031	300.02254	0.021394	440.02127	0.027311595
120.02259	0.00031	300.02379	0.021414	440.02267	0.000580336
120.0288	0.00031	300.02379	0.021434	440.02378	0.017524
120.03002	0.00031	300.02628	0.021454	440.03502	0.022952355
120.03002	0.00031	300.02628	0.021474	440.03504	0.024813794
120.03377	0.00031	300.02753	0.021494	440.22031	0.017548

120.03504	0.00031	300.02879	0.021514	440.88031	0.029344714
120.03504	0.00031	300.02879	0.021534	441.02047	0.022966267
120.03627	0.00031	300.02971	0.01506	442.53031	0.028861035
120.04129	0.00031	300.03127	0.027528	443.52031	0.023806
120.04131	0.01938	300.03252	0.015068	445.50031	0.00143475
120.04252	0.00031	300.03502	0.015064	446.16031	0.000514595
120.52142	0.00031	300.04127	0.01506	447.15031	0.023798
121.39606	0.00031	300.63031	0.021274	447.48031	0.024120011
123.01127	0.00031	302.94031	0.021274	447.81031	0.030024
124.41031	0.02238	305.01127	0.015064	448.14031	0.000305603
126.72031	0.00031	306.24031	0.030044	450.02254	0.000439266
127.05031	0.00031	306.57031	0.017544	450.02256	0.02881158
127.8162	0.00031	307.56031	0.023774	452.10031	0.001168506
130.02031	0.00031	307.89031	0.023794	453.42031	0.023786
133.47283	0.00031	309.54031	0.030024	454.08031	0.000875098
135.02879	0.00031	309.89877	0.023774	454.41031	0.00035792
135.03504	0.00031	310.20031	0.023794	454.74031	0.023774
135.33627	0.00031	310.86031	0.030044	455.07031	0.026437603
139.35502	0.00031	312.18031	0.023794	455.48002	0.001231805
140.00116	0.00031	313.17031	0.023794	455.85529	0.030044
140.00166	0.00031	313.50031	0.030044	456.62074	0.020226741
140.00193	0.02694	314.1511	0.017544	456.72031	0.027102036
140.00198	0.00031	314.49031	0.017524	457.64252	0.017320616
140.01379	0.00031	314.96652	0.023794	458.04031	0.028157413
140.01381	0.00031	315.02252	0.023774	458.37031	0.025509884
140.01382	0.00031	315.02254	0.017544	459.03031	0.023774
140.01506	0.00031	315.15031	0.030024	459.36031	0.00031767
140.0163	0.00031	316.47031	0.017544	459.69031	0.000232028
140.02002	0.00031	316.80031	0.017544	460.00129	0.036274
140.02002	0.00031	317.46031	0.017524	460.0016	0.01274088
140.02004	0.00031	317.79031	0.017544	460.00266	0.017548
140.02004	0.00214	318.45031	0.017524	460.00311	0.000271211
140.0213	0.00031	318.78031	0.030024	460.00879	0.012775121
140.02252	0.00031	319.11031	0.017524	460.01004	0.001086413
140.02254	0.00031	319.24215	0.017524	460.01007	0.025390968
140.02254	0.00031	319.44031	0.017544	460.01007	0.017528
140.02256	0.00031	320.00063	0.023774	460.01007	0.013589938
140.02258	0.00031	320.00173	0.023774	460.01007	0.017548
140.02377	0.00031	320.00752	0.036274	460.01009	0.000407863
140.02379	0.00031	320.01003	0.023794	460.01379	0.000199387
140.02379	0.02817	320.01005	0.023794	460.01506	0.000729657
140.02381	0.00031	320.01377	0.030024	460.01752	0.017544
140.03502	0.00031	320.01507	0.023774	460.01753	0.000463569
140.03504	0.00031	320.0151	0.023794	460.01754	0.017240664
140.25031	0.00031	320.01629	0.030024	460.01755	0.017544
140.91031	0.00031	320.01631	0.017524	460.02004	0.013029973
141.57031	0.00031	320.01644	0.017544	460.02004	0.012206798
143.52263	0.00031	320.01711	0.023794	460.02007	0.017548

143.55031	0.00031	320.01754	0.01757	460.02007	0.017528
145.20031	0.00031	320.01757	0.023774	460.02011	0.025920261
146.67131	0.00031	320.02004	0.017544	460.03502	8.97E-05
146.85031	0.00031	320.02004	0.023774	460.03504	0.024784933
147.18031	0.00031	320.02005	0.023774	461.34031	0.017528
147.51031	0.00031	320.02188	0.017524	461.72429	0.000370662
148.50031	0.032524	320.02238	0.017544	463.32031	0.000352467
148.83031	0.036274	320.02253	0.017524	463.65031	0.030024
149.49031	0.00031	320.02263	0.028774	463.98031	0.015734566
149.82031	0.00031	320.02377	0.010044	464.77078	0.017337878
150.03502	0.00031	320.02378	0.022544	464.97031	0.023778
150.03504	0.00031	320.02627	0.016306	465.02256	0.000570275
150.81031	0.00031	320.02629	0.016314	465.30031	0.000420826
156.09031	0.00031	320.03504	0.022564	465.96031	0.017552
160.00114	0.00033	320.03504	0.022528	466.49877	0.001097219
160.00166	0.017914	320.10031	0.022564	467.94031	0.028723107
160.00191	0.019434	320.76031	0.016306	468.60031	0.030028
160.01085	0.00031	321.41573	0.022532	469.26031	0.042544
160.01381	0.00031	322.41031	0.022544	469.59031	0.000497178
160.01381	0.00031	324.06031	0.022568	469.92031	0.017528
160.01381	0.00031	325.38031	0.010044	470.58031	0.000814704
160.01384	0.00031	326.04031	0.010048	471.57031	0.028069494
160.01386	0.00031	326.08002	0.022544	473.22031	0.011405641
160.01506	0.00031	326.37031	0.010028	473.55031	0.017544
160.01629	0.00031	327.03031	0.022528	474.21031	0.010895346
160.01631	0.00031	327.36031	0.01629	474.54031	0.025874419
160.02093	0.00031	328.29877	0.010048	474.87031	0.017528
160.02127	0.00031	328.35031	0.010044	476.19031	0.013526174
160.02254	0.00031	328.68031	0.010068	476.85031	0.025144043
160.02254	0.00031	329.01031	0.016286	477.51031	0.023806
160.02256	0.00031	329.34031	0.028794	479.49031	0.024226784
160.0226	0.00031	330.02254	0.010044	479.82031	0.000190885
160.02377	0.00031	330.02256	0.010044	480.00081	0.023778
160.02379	0.00031	330.02258	0.016286	480.00164	0.021363435
160.02379	0.00031	331.32031	0.022544	480.00263	0.000924058
160.02379	0.00031	331.65031	0.022544	480.00432	0.026345272
160.02627	0.02798	332.31031	0.022544	480.0088	0.042524
160.02627	0.00031	332.97031	0.022564	480.01002	0.00043943
160.03504	0.00031	334.95031	0.028842	480.01002	0.02794878
160.03504	0.00031	335.28031	0.022544	480.01629	0.02540046
160.38031	0.00031	335.94031	0.016298	480.01631	0.023806
161.09252	0.020414	336.93031	0.028794	480.01752	0.023794
161.70031	0.00031	338.25031	0.010044	480.02006	0.026735565
162.03031	0.00031	338.58031	0.010088	480.02006	0.036274
162.69031	0.00031	339.24031	0.01631	480.02012	0.001302508
163.02031	0.00031	340.00094	0.016314	480.02019	0.023802
163.35031	0.00031	340.00146	0.010048	480.02531	0.015094584
163.68031	0.00031	340.00171	0.01633	480.02627	0.027472869

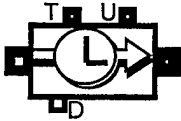


164.01031	0.00031	340.00376	0.010064	480.02631	0.025442943
165.02879	0.00031	340.01004	0.010048	480.0288	0.000217179
165.02881	0.00031	340.01005	0.016395	480.02882	0.023794
165.33031	0.00031	340.01007	0.010064	480.02943	0.029979268
165.66031	0.022184	340.01008	0.010068	480.03002	0.001437984
173.25031	0.00031	340.0101	0.016306	480.03003	0.024840627
173.58031	0.00031	340.01377	0.010084	480.03127	0.000336074
174.24031	0.00031	340.01379	0.010024	480.03152	0.030052
174.57031	0.00031	340.0138	0.016274	480.03252	0.012165489
176.55031	0.00031	340.01506	0.016278	480.03252	0.013388072
176.61127	0.00031	340.01754	0.022588	480.03502	0.017528
177.54031	0.00031	340.01754	0.022584	480.03502	0.000436306
177.62593	0.00031	340.02003	0.022544	480.03504	0.017548
178.86031	0.00031	340.02003	0.028822	480.03627	0.000314192
180.00043	0.00031	340.02009	0.022544	480.04627	0.012354685
180.00068	0.00031	340.02011	0.016278	480.15031	0.017548
180.00195	0.010854	340.02013	0.022548	481.47031	0.022632777
180.00257	0.00031	340.02013	0.010068	482.79031	0.014945171
180.01378	0.00031	340.02015	0.022524	483.12031	0.023782
180.01506	0.00031	340.02017	0.022528	483.45031	0.0273342
180.01629	0.00031	340.02019	0.010068	486.09031	0.026519526
180.02002	0.00031	340.02021	0.010024	486.75031	0.000849555
180.02005	0.00031	340.02023	0.010024	487.08031	0.00069212
180.02005	0.00031	340.02025	0.010068	487.41031	0.017528
180.02007	0.00031	340.02027	0.01652	487.74031	0.016801102
180.02129	0.00031	340.02029	0.010024	489.39031	0.013256533
180.02253	0.00031	340.02253	0.010088	489.46127	0.023774
180.02255	0.00031	340.03504	0.010024	490.05031	0.027152128
180.02257	0.029494	340.03504	0.020064	490.38031	0.000351232
180.02629	0.00031	340.23031	0.020048	490.71031	0.017548
180.02629	0.00031	340.56031	0.020056	491.37031	0.025322127
180.02882	0.00031	340.89031	0.020072	491.70031	0.000265486
180.02884	0.00031	340.98627	0.026274	492.06895	0.030044
180.02949	0.00031	341.19877	0.013834	493.02031	0.001477758
180.03002	0.00031	342.54031	0.020028	495.02252	0.000405161
180.03004	0.00031	343.20031	0.020044	495.02254	0.012916715
180.03004	0.00031	343.86031	0.026274	495.66031	0.017528
180.03055	0.00031	345.02252	0.02629	495.99031	0.025097733
180.03502	0.00031	345.02254	0.013838	496.32031	0.001242188
180.03504	0.00031	345.51031	0.020044	496.65031	0.011773121
180.03627	0.00031	345.84031	0.020064	496.98031	0.017532
180.04127	0.00031	346.17031	0.020044	498.30031	0.000394722
180.04129	0.00031	347.38511	0.020044	498.63031	0.02653971
182.16031	0.00031	348.15031	0.020064	499.62031	0.000298863

THIS PAGE INTENTIONALLY LEFT BLANK

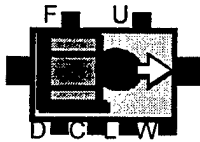
## APPENDIX L. EXTEND DEFINITION LIST

### ACTIVITY, DELAY



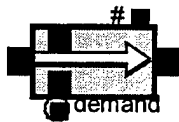
Holds an item for a specified amount of delay time, then releases it. The delay time is the value in the dialog or, if connected, the value at the D connector when the item is received (the connector overrides the dialog).

### ACTIVITY, MULTIPLE



Holds many items and passes them out based on the delay and arrival time for each item. The item with the smallest delay and earliest arrival time is passed out first. The delay time for each item is set through the D connector or, if nothing is connected there, can be specified in the dialog.

### ACTIVITY, SERVICE



Passes an item only when the demand connector is connected and certain conditions exist at the demand input (either demand's value is true [greater than 0.5] or it pulls in an item). Depending on the type of output connector (item or value) attached to demand, this block passes single items or passes a specified number of items. This block allows service on demand. You can think of this block as a path with a gate that opens on demand, where demand can accumulate.

## ADD



This block adds the three inputs on the left of the block and outputs the total.

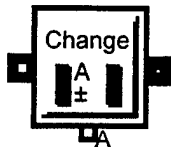
## CATCH

Catch



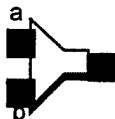
This block “catches” items sent by Throw blocks even though the blocks aren't connected by connection lines. Any number of Throw blocks can send items to a Catch block. The connection between the blocks is made at the Throw block by specifying in its dialog the label and block number of the Catch block. You could use the Throw and Catch blocks instead of using Combine blocks, even from inside one hierarchical block to inside another one.

## CHANGE ATTRIBUTE



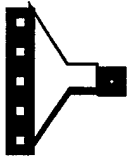
Changes an item's attribute value then passes the items through. You specify the name of the attribute to change, an operation to use in the change, and a modifier value to change with.

## COMBINE



Combines the items from two different sources into a single stream of items. This is different from the batch blocks which join items from several sources into one item. The items in the Combine block retain their separate identities and are not batched together.

## COMBINE (5)



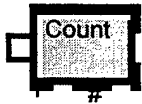
Combines the items from five different sources into a single stream. This is different from the batch blocks which join items from several sources into one item. The items in the Combine block retain their separate identities and are not batched together.

## CONSTANT



Generates a constant value at each step. You specify the constant value in the dialog (the default constant is 1). If the input is connected, the input value is added to the constant in the dialog. This block is typically used for setting the value for the inputs to other blocks. For example, you can use it for a steady flow of fluid, cash, or a delay time value.

## COUNT ITEMS



Passes items through and reports the total number of items passed in its dialog and at the # connector.

## DIVIDE



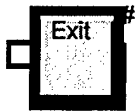
Divides the top input by the bottom input. You can choose whether a bottom input of 0 yields an output of noValue or stops the simulation with an error message.

## EXECUTIVE



This block is the heart of each discrete event model and must be placed to the left of all other blocks in the model. It allows the duration of the simulation to be controlled by the end time or by another number specified in the dialog. Generally you will have no reason to change the default values in the dialog.

## EXIT



Passes items out of the simulation. The total number of items absorbed by this block is reported in its dialog and at the # connector.

## GENERATOR



Provides items for a discrete event simulation at specified interarrival times. Choose either a distribution on the left, or choose the empirical distribution and enter probabilities in the table. Items can be created with a random distribution or at a constant rate of arrival. You can also specify the number of items output at each event in the dialog or at the V connector.

## GET ATTRIBUTE



Displays and/or removes attributes on items, then passes the items through. The attribute value is shown in the dialog and output at the A connector. You can also use this block to clone the item based on the number in an attribute.

## GET PRIORITY



Reads the priority of items then passes them through. The priority is shown in the dialog and output at the P connector. The priority number is usually used to route items. The D connector outputs 1 if the priority value has changed since the last item was read in.

## INFORMATION



Views and displays information about the items that pass through it. The first column in the table in the dialog is the time the item arrived in the block, the second is the priority of the item, and the remaining columns are attribute values for the named attributes. You must specify the names of attributes you wish to view. If an attribute is not found, its value is blank.

## INPUT RANDOM NUMBER



Generates random integers or real numbers based on the selected distribution. You can use the dialog or the three inputs, 1, 2, and three to specify arguments for the distributions. You can select the type of distribution: Uniform (integer or real), Beta, Binomial, Erlang, Exponential, Gamma, Geometric, HyperExponential, LogLogistic, LogNormal, Neg. Binomial, Normal, Pearson type V, Pearson type VI, Poisson, Triangular, Weibull, and Empirical. The Empirical distribution uses a table of up to 50 values to generate a discrete, stepped, or interpolated empirical distribution.

## LOGICAL AND



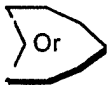
Performs logical AND operation on the inputs. If each of the two inputs is greater than 0.5, the output is 1; if none or only one of the inputs is greater than 0.5, the output is 0.

## LOGICAL NOT



Performs logical NOT operation on the inputs. If the input is greater than 0.5, the output is 0; otherwise the output is 1.

## LOGICAL OR



Performs logical OR operation on the inputs. If either of the inputs is greater than 0.5, the output is 1; if neither of the inputs is greater than 0.5, the output is 0.

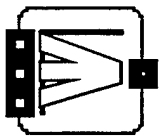


## MEASUREMENT



For each item that enters, the block looks for the item's priority and up to five attributes named in the dialog. If it finds the priority and named attributes, it reports their values in the dialog and at the value output connectors at the top of the block.

## MERGE



Receives items from up to three sources and merges them into a single stream. Note that the items remain individual and unique: they are not joined or batched together, they are just funneled from multiple flows into one flow. Items enter the stream in the order received by the block and flow directly to the output.

## MULTIPLY



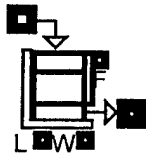
This block multiplies the inputs.

## PROGRAM



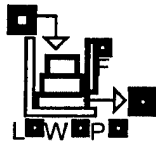
Provides items by scheduling many items to be output into the model. This is similar to the Generator block, except the arrival times of the items are scheduled rather than random. Also, you can assign a value, a priority, and attributes to each item generated. These items (with a given output time, item value, priority, attribute name, and attribute value) may repeat on a regular basis. This block is useful for repetitive or timed needs. Up to 500 events can be generated before repeating a sequence.

## QUEUE, FIFO



A first-in-first-out (FIFO) queue. The maximum length, which determines how many items the queue can hold, can be set in the dialog. You can specify that the simulation should stop when the queue is full (reaches the maximum length). You can also see the average queue length, average wait time, and utilization of the queue in the dialog.

## QUEUE, PRIORITY



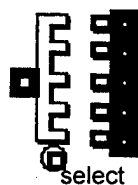
A queue that releases items by priority. The item in the queue with the lowest numerical value for its priority will be released first. If the items in the queue all have the same priority, it becomes a first-in-first-out (FIFO) queue. The maximum length, which determines how many items the queue can hold, can be set in the dialog. You can specify that the simulation should stop when the queue is full (reaches the maximum length).

## SELECT OUTPUT



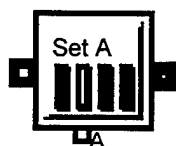
Passes the input value to one of five outputs according to the value of the T connector. The top output is selected if the T connector is 1 and the bottom output is selected if it is 5. For connectors that are not selected, the dialog lets you specify an output value of either noValue, 0, or a repeat of the last value they output.

## SELECT OUTPUT (5)



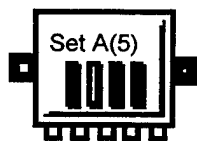
Selects one output connector out of the five available, based on a decision. The item at the input is passed through the selected output. By default, the block chooses outputs sequentially (toggles outputs); you can also choose based on the select connector.

## SET ATTRIBUTE



Sets the attributes of items passing through the block. Up to seven attribute names and values may be assigned to an item with each Set Attribute block. The attributes may add to or replace existing item attributes. You can specify the value of one of the attributes with the A connector. The value at the A connector overrides the corresponding value in the dialog.

## SET ATTRIBUTE (5)



Sets the attributes of items passing through the block. Up to five attribute names and values may be assigned to an item with this block. The attributes may add to or replace existing item attributes. You can specify the value of each of the attributes with the value input connectors; these connectors override values set in the dialog.

## SET PRIORITY



Assigns a priority to items that pass through. The priority value may be set at the P connector or, if no connection is made there, in the dialog. Note that the lowest value (including negative numbers) has the top priority.

## SUBTRACT



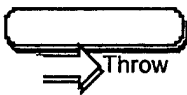
Subtracts the bottom input from the top input.

## SYSTEM VARIABLE



Allows you to regulate some aspect of the model based on the status of the simulation. It is usually used in conjunction with a decision-type block, for example, to halt a process after current time reaches a certain value. The variables you can use are: current run number, current step, current time, end time, number of runs, number of steps, start time, and time step.

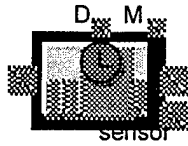
## THROW



This block "throws" items to a Catch block without using an output connector or connection lines. Any number of Throw blocks can send items to a single Catch block. The connection between the blocks is made by specifying the label and block number of the Catch block in the Throw block's dialog. You could use the Throw and Catch blocks

instead of using Combine blocks, even from inside one hierarchical block to inside another one.

## **TIMER**



Displays the time that it takes an item to pass between two parts of the model. The block adds a time tag to an item passing through and records it in a list in the dialog. You can find how long it takes for the item to get from this block to another one (the target block) by attaching the sensor connector to the output of the target block.

THIS PAGE INTENTIONALLY LEFT BLANK

## APPENDIX M. ACRONYMS

1. AAV - Advanced Amphibious Assault Vehicle
2. ACE - Aviation Combat Element
3. ACK - Acknowledgement
4. ACTD - Advanced Concepts Technology Demonstration
5. AP - Access Point
6. BLOS - Beyond Line of Sight
7. BN - Battalion
8. CDMA - Code Division Multiple Access
9. CE - Command Element
10. CID - Combat Identification
11. CJTF - Commander Joint Task Force
12. CO - Company
13. COC - Combat Operations Center
14. COI - Critical Operational Issues
15. COMM - Communication
16. CP - Command Post
17. CSMA/CA - Carrier Sense, Multiple Access with Collision Avoidance
18. CSSE - Combat Service Support Element
19. CTS - Clear to Send
20. DSSS - Direct Sequence Spread Spectrum
21. ELB - Extended Littoral Battlespace
22. ENG - Engineer
23. EUT - End User Terminal
24. FDMA - Frequency Division Multiple Access
25. GCE - Ground Combat Element
26. GPS - Global Positioning System
27. GUI - Graphical User Interface
28. HMMWV - High Mobility Multi-purpose Wheeled Vehicle
29. HQ - Headquarters
30. IEEE - Institute of Electrical and Electronic Engineers
31. ISM - Industrial, Scientific, and Medical Frequency
32. JTF - Joint Task Force
33. JTIDS - Joint Tactical Information Distribution System
34. KBPS - Kilobits Per Second
35. LAR - Light Armored Reconnaissance
36. LAN - Local Area Network
37. LOS - Line of Sight
38. LSB - Landing Support Battalion
39. MAGTF - Marine Air-Ground Task Force
40. MAINT - Maintenance

41. MAW – Marine Air Wing
42. MBPS – Megabits Per Second
43. MCCDC – Marine Corps Combat Development Command
44. MEB – Marine Expeditionary Brigade
45. MED - Medical
46. MEU – Marine Expeditionary Unit
47. MSG – Message
48. MT – Motor Transportation
49. OMFTS – Operational Maneuver From the Sea
50. ONR – Office of Naval Research
51. OTA - Office of Technology Assessment
52. OTH – Over the Horizon
53. PC – Personal Computer
54. PLT - Platoon
55. REG – Regiment
56. RECON – Reconnaissance
57. RLT – Regimental Landing Team
58. RTS – Request to Send
59. STOM – Ship to Objective Maneuver
60. SUP - Supply
61. TDMA – Time Division Multiple Access
62. UAV – Unmanned Aerial Vehicle
63. USCINCPAC - Commander in Chief, United States Pacific Command
64. VMF – Variable Message Format
65. VTC – Video Teleconferencing
66. WARNet – Wireless Wide Area Battlernet



## LIST OF REFERENCES

1. United States Congress, Office of Technology Assessment, *Who Goes There: Friend or Foe?*, OTA-ISC-537, Washington D.C., September 1993.
2. United States Marine Corps, *Combat Identification Study Final Report*, The Marshall Associates Team, Sterling, Virginia, 1999.
3. Cruz, Enrique, *Fratricide in Air-Land Operations*, Master's Thesis, Naval Postgraduate School, Monterey, California, December 1996.
4. United States Marine Corps, *Operational Maneuver From The Sea*, Concepts Division, Marine Corps Combat Development Command, Quantico, Virginia, 1998.
5. United States Marine Corps, *Ship To Objective Maneuver*, Concepts Division, Marine Corps Combat Development Command, Quantico, Virginia, 1998.
6. Office of Naval Research, *Extending the Littoral Battlespace Assessment Final Report*, July 1999.
7. Office of Naval Research, *Extending the Littoral Battlespace Objectives*, April 1998.
8. Office of Naval Research, *Communications and Networking System*, June 1997.
9. Office of Naval Research, *Extending the Littoral Battlespace: Advanced Concept Technology Demonstration*, June 1999.
10. Lucent Technologies, *WaveLAN High-Speed Wireless Network*, August 1999.
11. Lucent Technologies, *WaveLAN IEEE 802.11 Compliance*, September 1997.
12. Lucent Technologies, *WavePOINT Access Point*, August 1999.
13. Marconi Corporation, "Technical Overview of the AN/VRC-99A," [<http://www.cni.marconi-na.com/html/vrc-99.html>].
14. Diamond, Pat and Jim Rivera, *Extend, Simulation Software for the Next Millennium, User's Manual*, Imagine That, Inc., San Jose, California, 1997.
15. Kish, Scott, *A Proposed Fire Support Communication Architecture for Extending the Littoral Battlespace Advanced Concept Technology Demonstration '01*, Master's Thesis, Naval Postgraduate School, Monterey, California, June 1999.

16. United States Marine Corps, *Operational Maneuver From the Sea C4ISR Architecture*, Requirements Division, Marine Corps Combat Development Command, Quantico, Virginia, 1999.
17. Jon Grossman, *Battalion-Level Command and Control*, RAND Study, Arroyo Center, August 1994.
18. Joint Chiefs of Staff, *Variable Message Format Technical Interface Design Plan – Test Edition Reissue Three*, Joint Interoperability and Engineering Organization, Director for Command, Control and Communications Systems (J-6), December, 1999.
19. Davis, Scott, *Modeling A Joint Combat Identification Network*, Master's Thesis, Naval Postgraduate School, Monterey, California, December 1997.
20. Parker, Michael and Arp, Lance, *Scalability of Wireless Tactical Communications in Support of a Marine Corps Expeditionary Brigade*, Monterey, California, June 2000.
21. Center for Naval Analysis, *Project Culebra: Establishing the MEF (afloat) in 2010*, July 1999.
22. Moore, G.E. 1965, *Electronics* (Volume 38 Number 8), pp. 114-117
23. SE4020 (Dr. John Osmundson), Naval Postgraduate School, *Class Project: Combat Identification*, June 1997

## BIBLIOGRAPHY

1. United States Marine Corps, *Beyond C2: A Concept for Comprehensive Command and Coordination of the Marine Air-Ground Task Force*, Concepts Division, Marine Corps Combat Development Command, Quantico, Virginia, 1998.
2. CNO N6 Copernicus Home Page, Department of the Navy, [<http://diamond.spawar.navy.mil/specs/wise/wiseup/copern.html>], 1995.
3. Imagine That Inc., [<http://www.imaginetthatinc.com>], 2000.
4. Joint Vision 2010, Chairman of the Joint Chiefs of Staff, Washington, D. C.
5. Concept for Future Joint Operations (CFJO), Expanding Joint Vision 2010, May 1997, Chairman of the Joint Chiefs of Staff, Washington, D. C.
6. Joint Publication 6-0, Doctrine for Command, Control, Communications, and Computers (C4), Systems Support to Joint Operations, May 1995.
7. Smith, Brian, *The Development of a Littoral Region Area Communications Network in Support of Operational Maneuver from the Sea*, Master's Thesis, Naval Postgraduate School, Monterey, California, September 1998.
8. United States Marine Corps, *Command and Control*, Doctrinal Publication, Concepts Division, Marine Corps Combat Development Command, Quantico, Virginia 1996.
9. United States Navy, *Naval Command and Control*, Doctrinal Publication, Office of the Chief of Naval Operations, Washington, D. C., May 1995.
10. Lucent Technologies, *Wireless-to-Wireless Bridging Education Program*, September 1997.

11. Lucent Technologies, "WaveLAN: The Broader Picture," *WaveWORLD Education Special*, June 1999.
12. "Battlefield Combat ID System," [<http://www.monmouth.army.mil/peoiew/cid7.htm>], February 1999.
13. "Office of the Product Manager Combat Identification Home Page," [<http://www.monmouth.army.mil/peoiew/pmcid/cid1.htm>], September 1999.
14. Rodrigues, Louis, "Joint Exercise Fields Friend or Foe Technology," Air Force News, [[http://www.af.mil/news/Mar1999/n19990305\\_990351.html](http://www.af.mil/news/Mar1999/n19990305_990351.html)], March 1999.
15. "All Service Combat Identification Evaluation Team Home Page," [<http://www.sdd.sri.com/ASCIET/>], September 1999.
16. Garamone, Jim, "Fixes Touted to Combat Friendly Fire Casualties," *Defense Link*, [[http://www.defenselink.mil/news/Feb1999/n02021999\\_9902027.html](http://www.defenselink.mil/news/Feb1999/n02021999_9902027.html)], February 1999.
17. Garamone, Jim, "Friendly Fire that Changed a War?," *Defense Link*, [[http://www.defenselink.mil/news/Feb1999/n02021999\\_9902028.html](http://www.defenselink.mil/news/Feb1999/n02021999_9902028.html)], February 1999.
18. Office of Naval Research, *Extending the Littoral Battlespace Advanced Concept Technology Demonstration Update*, December 1998.
19. Office of Naval Research, *Extending the Littoral Battlespace Advanced Concept Technology Demonstration Post Full Systems Test 1 Update*, December 1998.
20. Office of Naval Research, *Extending the Littoral Battlespace Advanced Concept Technology Demonstration Update*, March 1999.
21. "Extending the Littoral Battlespace Home Page," [<http://www.acq.osd.mil/at/elb.htm>], November 1999.

## INITIAL DISTRIBUTION LIST

1. Defense Technical Information Center..... 2  
8725 John J. Kingman Road, Ste 0944  
Fort Belvoir, VA 22060-6218
  
2. Dudley Knox Library..... 2  
Naval Postgraduate School  
411 Dyer Road  
Monterey, California 93943-5101
  
3. Director, Training and Education ..... 1  
MCCDC, Code C46  
1019 Elliot Road  
Quantico, VA 22134-5027
  
4. Director, Marine Corps Research Center..... 2  
MCCDC, Code c40RC  
2040 Broadway Street  
Quantico, VA 22134-5107
  
5. Marine Corps Representative..... 1  
Naval Postgraduate School  
Code 037, Bldg. 330, Ingersoll Hall, Room 116  
555 Dyer Road  
Monterey, CA 93943
  
6. Marine Corps Tactical Systems Support Activity ..... 1  
Technical Advisory Branch  
Attn: Librarian  
Box 555171  
Camp Pendleton, CA 92055-50580
  
7. Professor John Osmundson, CC/OS ..... 1  
Naval Postgraduate School  
Monterey, CA 93943-5101
  
8. Project Officer, Combat Identification ..... 1  
Marine Corps Systems Command  
Quantico, Virginia 22134
  
9. Combat Identification Assessment Division..... 1  
Joint Staff J-8/CIDAD  
Pentagon Room 5D577  
Washington, D. C. 20318-8000

10.	Captain Kevin J. Stewart.....	3
	1056 Grass Valley Road	
	Chula Vista, CA 91913	